

Appraisals of Ambiguous Viral Health Threats

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Abstract

Virologists predict that pandemics will continue to occur and that due to global travel, viral strains could be rapidly transmitted worldwide. In addition to the physical illness that might occur, the threat of a pandemic may also have psychological repercussions and could influence the adoption of self-protective behaviours (e.g., receiving vaccination). The present investigation determined individuals' appraisals of ambiguous health threats, the psychological toll that a period of uncertainty exacted, and the behaviours utilized for protection in relation to the 2009 H1N1 pandemic. As well, the role intolerance of uncertainty, coping strategies, and media trust played in perceptions of illness was examined. Unexpectedly, respondents were generally not threatened by H1N1, and only 30% had been vaccinated. Moreover, participants either did not trust the media, or felt that the information provided was sensationalized or confusing, and these opinions were related to declining vaccination (Study 1, $N = 1027$). Participants who could not tolerate uncertainty appraised the virus to be uncontrollable and stressful, endorsed emotion-focused coping, and reported elevated levels of anxiety (Study 2). Following the pandemic, individuals reported moderate anxiety about a novel or familiar viral threat occurring in the future. A tendency to appraise ambiguous life events as stressful was related to being threatened by a virus, which also predicted a unique amount of variance in anxiety (Study 3, $N = 316$). Finally, participants believed they were more likely to develop cancer compared to their chances of contracting H5N1, and indicated they were more likely to be screened for cancer than they were to receive H5N1 vaccination (Study 4, $N = 239$). Participants consistently displayed an optimism bias, believing that they were less likely than their close friend to develop an illness; and both they and their

friends were less likely to fall ill than members of the general public. It is recommended that in order to encourage adherence to prophylactic behaviours, public health agencies ought to create an environment to increase trust in the information provided by the media. Additionally, comprehensive information may reassure those who cannot tolerate uncertainty, diminishing the psychological impact an ambiguous viral threat can elicit.

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Chapter 1: General introduction

Protecting the health of citizens requires both extensive efforts from governments worldwide, and the adherence to set measures by the general population. Often, the progression of a disease is dependent on the rate of compliance with the recommended preventative behaviours to minimize the spread of a contagious illness. Evaluating the public's judgement of a health threat is of fundamental importance to understand their responses to prescribed actions. Of course, appraisals and responses to an ambiguous threat are also dependent on numerous personal and social factors. This was most recently demonstrated during the H1N1 swine flu pandemic.

In March of 2009, an unknown respiratory illness infected individuals in Mexico (World Health Organization, 2009). Only a month later the illness, identified as the H1N1 virus, was present in the United States, Canada, and Europe. During April of 2009, the World Health Organization (WHO) raised its warning from level three (i.e., little transmission occurring) to level five (i.e., indicating that a pandemic was imminent; WHO, 2009). The virus quickly reached this pandemic level, causing human deaths worldwide and prompting the WHO to consider the imminent spread of the H1N1 virus to be a public health emergency. Once vaccination began in October of 2009, the U.S. declared a national state of emergency as insufficient vaccine was available to immunize all those at risk. By December of 2009, the H1N1 virus was considered to have peaked, and the pandemic was eventually classified as having been moderate (WHO, 2009).

Though there had been prominent viral threats in the years prior to the appearance of H1N1, such as SARS in 2002, the swine flu elicited a much greater government response and garnered greater media attention than earlier viral threats. Indeed, the

pandemic resulted in over ten thousand deaths, although the potential spread was less than had been feared. However, this health emergency was also surrounded by controversy regarding vaccine safety, as well as questions to the true motivation behind the media attention given to the pandemic. Thus, it was the aim of the proposed studies to gain a better understanding of the public perception of, and reaction to, a viral health threat. Due to the ambiguous nature of the situation we examined the influence of traits such as intolerance of uncertainty and appraisals of ambiguous situations on the assessment of a threatening health situation, to determine whether or not individuals were predisposed to view an uncertain event in a pessimistic light. We also examined individuals' perceptions of illness, and the trust they had in the media and government to report reliable and valid information regarding these threats, as this might influence their sensitivity to these threats. Correspondingly, the predictors of responses to health threats, such as coping and anxiety, were also addressed.

Perceptions of Illness

Health models. There are a number of models that have attempted to explain how individuals evaluate illness, and how they determine whether or not a disease is a threat to their well-being. These perspectives emphasize the influence of cognitive and emotional personal appraisals.

Parallel processing model. The parallel processing model proposes that in the face of fear, appeals to communicate information about a health threat involve two appraisals that occur independently. The first is the cognitive appraisal of threat, which creates a desire to control potential danger. The second is the emotional appraisal of fear and distress, which generates a desire to control the fear (Cameron & Leventhal, 2000).

This view subsequently evolved into the extended parallel processing model, according to which perceptions of threat are dependent on the perceived severity of, and susceptibility to, the threat. If the severity and susceptibility of the threat are perceived to be low, an individual can disregard the health message. If the threat is perceived to present a great risk, individuals are motivated to complete the second appraisal, that of efficacy (both the perceived efficacy of the prescribed preventative actions and one's personal self-efficacy to engage in the recommended behaviours) to determine the fear felt in regard to the threat (Witte, 1994). When perceptions of efficacy are greater than perceptions of the health threat, cognitive danger control processes will encourage protection motivation, and an individual will engage in the recommended protective actions. In contrast, when threat perceptions dominate over perceptions of efficacy, emotional fear control processes promote defensive motivation. In this scenario, individuals focus on coping with the emotions related to the situation, rather than the actual danger associated with the situation; alternatively, they might attempt to reduce their fear by minimizing the threat and avoiding or rejecting the recommended behaviours (Witte, 1994). It has been posited that the combination of the cognitive and emotional experience are the critical predictor in determining evaluation of a health threat (Witte, 1994). Indeed, cancer worry among women with and without a cancer history was only reported if they experienced physical symptoms (danger) and believed they would develop cancer in the future (fear). The experience of either of these factors alone did not elicit feelings of concern (Easterling & Leventhal, 1989).

Self-regulation model. The common sense model of illness, or the self-regulation model, extended the parallel processing model to include five factors that determined

one's representation of an illness: identity (e.g., symptoms and names), cause (e.g., internal or external, genes or infection), timeline (e.g., duration of sickness, or onset age), consequences (e.g., severity of illness, daily or long term function influences) and control (e.g., prevention, control and curability beliefs; Cameron and Leventhal, 2000). The evaluation of each of these concepts is based on factual information as well as previous experiences and emotional responses (e.g., anxiety, fear). Individuals obviously prefer to have knowledge about their illness, rather than having ambiguous symptoms that do not lead to a firm diagnosis (Hale, Treharne, & Kitas, 2007). Appraisals of the factors in the common sense model as positive (e.g., curable) or negative (e.g., outcome not within the individuals control) have been tied to well-being among individuals with various illnesses. In this regard, perceptions that the illness had very serious implications, that progression was out of the individuals' control, and that it was caused by an individual's behaviour predicted poorer psychological well-being among individuals living with chronic fatigue syndrome (Moss-Morris, Petrie, & Weinman, 1996), Huntington's disease (Kaptein et al., 2006) and among men post-treatment for prostate cancer (Traeger et al, 2009). Individuals recovering from a heart attack who perceived their illness to have long-term consequences reported more debilitation and took a longer period of time to return to work compared to those who perceived the event to have short-term implications. Those who felt that heart disease was not curable or controllable were less likely to engage in rehabilitation in comparison to those who believed their health could improve (Petrie, Weinman, Sharpe, & Buckley, 1996). Furthermore, cognitive behavioural therapy has been used to alter perceptions of illness to be more accurate and more positive, and this cognitive restructuring resulted in decreased experiences of pain,

and improved functional outcome among myocardial infarction patients (Petrie, Cameron, Ellis, Buick, & Weinman, 2002).

In the case of H1N1, most of these five factors could not be determined by members of the general public given the ambiguity of the information being provided by government health agencies. This included confusion over the uniqueness of H1N1 symptoms from those of other influenza strains, and the varying severity of symptoms and outcomes that were being reported (i.e., mild flu versus severe symptoms). The common sense model proposes that the appraisals of these five factors can be fluid and may change over time and across experiences, yet it is the appraisal of these factors that influence how one copes with, and responds to, the situation (Cameron and Leventhal, 2000).

Health belief model (HBM). According to this model, engagement in health protective behaviours could be predicted by the simultaneous occurrence of a health threat great enough to garner one's attention, a perception of susceptibility and great severity of the health threat, as well as the perceived benefits of the necessary safeguard behaviour(s) outweighing the barriers related to these actions (Rosenstock, 1974). This view was later extended to include one's perceived self-efficacy to enact the recommended behaviour as an important aspect in predicting protective action (Rosenstock, Strecher, & Becker, 1988). Self-efficacy is of particular importance in relation to the threat of chronic illnesses wherein one must believe that they have the ability to overcome a hurdle, such as addiction to smoking or beginning and maintaining a regimented exercise program, in order to make a commitment to their health change behaviours (Rosenstock et al., 1988).

Protection motivation theory (PMT). When information is provided regarding a given health-related event, one's experience of fear of that situation is predicated on threat appraisals (determined by the severity of the threat and the probability of the event occurring) coupled with the perceived ability to protect themselves from the threat or take the recommended preventative action (also conceptualized as a coping appraisal; Rogers, 1975). These factors may individually and interactively influence the degree to which individuals are motivated to protect themselves, which then mediates the relationship between each of these appraisals and attitude change, and the acceptance of the recommended behaviour. It follows that greater appraisals of severity, probability of occurrence, and efficacy of protective measures are more likely to result in attitude change. This perspective emphasizes the cognitive process of appraisals, rather than the emotional input of fear (Rogers, 1975). A meta-analysis revealed that the PMT successfully predicted intentions to change behaviours, but was less efficacious in predicting actual future actions (Milne, Sheeran, & Orbell, 2000).

Uncertainty in illness theory. Uncertainty occurs in relation to illness when individuals are not able to form expectancies regarding health outcomes (Mishel, 1990). In this instance, the uncertainty in illness theory purports that one can make inferential appraisals, where information about the situations is compared to that of previous experiences. If the inferences that can be drawn from previous experiences are of an optimistic nature, these reassuring comparisons become the focus, and it is assumed that this positive outcome will occur again. However, if the inferences are negative, the situation is appraised as one that is dangerous. In the latter scenario, coping strategies are utilized to reduce the uncertainty of the situation, and avoid the danger (Mishel, 1990).

In the former, coping strategies are implemented to maintain the uncertainty, as the lack of definitive details allows for a positive outcome to continue to be assumed. In the case of a health situation where a poor outcome is seen to be imminent, the presence of uncertainty, even if it is fairly modest, allows one to make positive appraisals of the situation, even if these are illusory (Mishel, 1990). Minor ambiguities are automatically perceived in a faulty positive light in order to hold onto hope in the otherwise bleak situation.

Understandably, there are a great number of factors that may influence how one views an uncertain situation. To a considerable extent, an individual's perception of their risk related to a health threat is governed by their health literacy, which comprises their ability to gather, interpret, and comprehend health knowledge and services to make informed health decisions (Ratzan, 2009).

Media trust. In the face of an ambiguous threat, such as that elicited by a potential H1N1 pandemic, an individual's perceived appraisal of risk and subsequent decision making is governed by health information, which is often obtained from medical professionals and public health agencies (Leppin & Aro, 2009; Ratzan, 2009). The latter is frequently transmitted by various media outlets, although both valid and/or disreputable information can be obtained from an array of websites (Weber, Derrico, Yoon, & Sherwill-Navarro, 2009). Thus, the appraisals individuals make concerning imminent threats might also be influenced by the trust they have in the source of the information (Elledge, Brand, Regens, & Boatright, 2008). During the peak of the swine flu virus, H1N1 was the top news story throughout most media outlets, and the government provided information on risks and preventative behaviours. However,

providing risk assessments to the public has proven to be difficult as not speaking soon enough raises criticisms of withholding information, and imparting too much information can be perceived as overwhelming (Fischhoff, 1995). Understandably, however, the ambiguity and uncertainty of the situation was threatening to the public, promoting feelings of anxiety among some individuals. The threatening H1N1 situation may have been compounded by mistrust in federal agencies, as well as the view that the situation appeared to be 'hyped' by the media, and the perception that local officials were not sufficiently experienced or knowledgeable about the threat (Larson & Heymann, 2010). Contradictory reactions to the media have been reported as individuals indicated that it played a large role in highlighting relevant risks and promoted behaviour change (e.g., participating in recycling programs), but also that they may experience media overexposure or fatigue and that they do not worry about all the concerns the media suggests they should (Hawkes, Houghton, & Rowe, 2009). Indeed, the public has expressed distrust regarding the information provided through the belief that media outlets overemphasize and sensationalize health risks, whereas the government diminishes risk to avoid worry and panic (Elledge, Brand, Regens, & Boatright, 2008). For instance, media reports on Avian Flu were found to both quell fears by providing accurate information, but also promoted inappropriate anxiety (Jones, Waters, Holland, Bevins, & Iverson, 2010). Individuals who tend to be wary of uncertain situations may increase or decrease the importance of reported health risks in accordance to the perceived biases they believe public health agencies hold (Fischhoff, 1995). Though the public may criticize or mistrust the information provided by both the government and the

media, there is still an expectation that these outlets will supply information on the health threat, which provides a basis for the public to form their opinion on the potential risk.

Despite efforts from media and government agencies to provide accurate information to the public, the way this information is appraised can vary greatly. Indeed, uncertain and ambiguous threats have become increasingly common, but because these threats often do not materialize as actual traumatic events, individuals could potentially become sceptical of pronouncements concerning imminent catastrophes. By example, the impact of severe acute respiratory syndrome (SARS) and avian flu were contained, and the effects of West Nile disease were relatively limited. With repeated false alarms, individuals have become increasingly more sceptical about such pronouncements, despite the fact that even a single correct prediction of a pandemic can have marked consequences for those who choose not to be inoculated against the disease.

Appraisals of risk. According to the transactional model when confronted with a potential stressor, an individual first makes a primary appraisal to determine whether or not the stressor is a threat to their well-being. If the stimulus is considered to be a threat, the individual then performs a secondary appraisal wherein they determine if they have the ability and/or resources to contend with it (Folkman and Lazarus 1980). Threats to well-being are an obvious source of distress, particularly when the nature of the threat is not well understood, its occurrence is uncertain, its nature ambiguous, and when individuals appraise themselves as having little control over the stressor's onset or termination (Anisman & Matheson, 2005; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). To be sure, it is the perception of one's risk that has more of an influence on their subsequent behaviours, than the estimated or true risk that may be

calculated by professionals (Hevey, 2005). It is well documented that many individuals possess unrealistic optimism (optimism bias), when considering the likelihood for events to occur to them. For example, this bias has been reported with respect to the probability of experiencing problems with alcohol (Dillard, Midboe, & Klein, 2009), risk and survival from breast or prostate cancer (Clarke, Lovegrove, Williams, & Machperson, 2000), or the development of skin cancer as a result of sun tanning (Branstrom, Kristjansson, & Ullen, 2005; Clarke, Williams, & Arthey, 1997). Individuals, regardless of age, gender, or education, believe they have an above average chance of experiencing an array of positive general life events, and a below average chance of experiencing negative ones (Weinstein, 1980, 1987), and individuals with greater perceptions of control, exhibit a greater optimism bias (Klein & Helweg-Larsen, 2002). While smokers in one study recognized that they were at a higher risk of developing smoking-related illnesses compared to non-smokers, they still exhibited a bias in that they believed their chances of contracting these diseases were less than that of other smokers (McKenna, Warburton, & Winwood, 1993). It may be this optimism bias that prevents individuals from engaging in recommended health behaviours. In the case of H1N1, initial examination of individuals' reactions to this threat revealed mild to moderate personal concerns about contraction (12-25%), but higher levels of concern (40%) regarding family members contracting the illness (Goodwin, Gaines, Myers & Neto, 2010; Rubin, Amlot, Page & Wessely, 2009), possibly reflecting the individuals' optimistic self-bias, or that family members generally worry more about others than they do in regard to themselves.

Three hypotheses have addressed the directional effects of risk appraisals. The accuracy hypothesis posits that individuals who engage in risky behaviours should perceive their personal risk to be elevated, and that this would be positively correlated with preventative behaviours to minimize this risk. Based on this theory, however, causal relationships cannot be drawn, as it may also be that those who engage in preventative behaviours justify doing so by perceiving the risks to be elevated if one had not performed the recommended action (Brewer, Weinstein, Cuite, & Herrington, 2004). The behaviour motivation directional hypothesis states that current perceptions of risk lead to (cause) changes in behaviour such that, preventative actions may be taken following the recognition of risk (effect; Brewer et al., 2004). Finally, the risk reappraisal hypothesis asserts that once behaviours to reduce the effects of a threat have been taken (or even once an intention is created), individuals will perceive the risk to be less severe (Brewer et al., 2004). Actions taken to reduce the risk of contracting H1N1 may have been engagement (e.g., using hand sanitizer) or avoidant (e.g., not taking public transportation); but, regardless of the method, they would only have been performed if they were appraised to be necessary and/or effective, and were deemed to be within individuals' control.

Most decision making theorists assume that choices made in risky situations are formed by individuals assessing the consequences of all possible outcomes, admittedly with some bias, and then making a cognitive choice (Lowenstein, Weber, Hsee, & Welch, 2001). However, decision making process may also be influenced by emotions at the time a decision is being made, as well as in anticipation of how the individual might feel if they make a particular decision (Lowenstein et al., 2001). Of course, there are

numerous factors that might contribute to the experiences of anxiety related to the threat posed by the H1N1 pandemic, including the way in which an individual copes with ambiguous challenges and an individual's propensity to deal with uncertain events (Rosen, Knauper, & Sammut, 2007), which could potentially influence decision making.

Intolerance of uncertainty. Uncertainty in any aspect of life can be stressful, but it may be particularly harrowing when the uncertainty surrounds health and survival. The ability to tolerate unknown aspects of a health risk situation may be dependent on the type of stressor experienced. An unpredictable stressor is one that is certain to occur, however, the time at which it will appear is unknown (e.g., we will all eventually die, but we do not necessarily know how or when). In contrast, an uncertain stressor is one that may or may not occur, and if it is to occur, its timing remains uncertain (Anisman & Matheson, 2005). Ordinarily, this waiting or anticipation of aversive events has been found to elevate levels of anxiety (Grillon, Baas, Lissek, Smith, & Milstein, 2004). However, the distress provoked by uncertain and unpredictable stressors are more pronounced than that elicited by certain and predictable challenges (Anisman & Matheson, 2005). When confronted with an uncertain situation, individuals may utilize their personal control to gather knowledge and make a decision on how to best face the situation. Indeed, perceptions of personal control may buffer the effects of stress and risk on negative affect, physical and psychological well-being (Diehl & Hay, 2010; Ruthig, Chipperfield, Perry, Newall, & Swift, 2007). However, when attributions of control or resources are unavailable, worry and concern may ensue regarding the ambiguity of the scenario (Alaszewski & Coxon, 2009).

The level of uncertainty that can be tolerated is a trait that individuals bring into an ambiguous situation, which predicts how they might appraise uncertain events (Ladouceur, Gosselin, & Dugas, 2000; Rosen et al., 2007). High intolerance of uncertainty has been found to exacerbate the relation between daily stressors and increased anxiety (Chen & Hong, 2010), and not unexpectedly, increased intolerance of uncertainty as well as the desire to reduce uncertainty, was found to predict increased information seeking and monitoring of the situation (Rosen et al., 2007). In the context of broad health threats, practical and realistic information provided by a government organization may diminish the perceived threat and prevent the worry and hysteria related to illness contraction (Balaratnasingam & Janca, 2006). In contrast, obtaining information that only provides ambiguous estimates related to viral threats may serve to increase perceptions of uncertainty, and thereby increase anxiety. By example, a majority of individuals believed that they would contract Avian flu, and three quarters of the sample predicted very severe effects, even though only vague estimates were provided by health officials regarding risks related to this illness (Paek et al., 2008). Yet, it will be recalled that individuals do not immediately take heed of every risk portrayed by the media (Hawkes et al., 2009). Given these contradictory outcomes, it is possible that a number of intra- and interpersonal factors work together to define the effects of uncertainty on an individuals' perception of illness, and their well-being in a time of a health threat.

Reactions to Illness

Coping. Although an individuals' coping style is generally considered to be stable over time, the strategy utilized to deal with an explicit illness (e.g., diagnosis of a

particular type of cancer or heart disease) versus a health threat that is uncertain (e.g., the possibility of a pandemic), might be different from one another, and may vary from those used to deal with everyday life events. It will be recalled that according to Folkman and Lazarus (1980), coping with a stressor begins with primary appraisal in which a potential threat is assessed. In the context of H1N1, primary appraisal would begin when an individual hears about swine flu and considers the risk that they may develop the virus. This would be followed by secondary appraisals, where one would evaluate whether they have the resources to combat H1N1. This evaluation in turn, influences the strategies that individuals would use to cope with the stressor. In response to health threats, secondary appraisals would be largely dependent on the informational and educational support provided by physicians and health agencies, or the information that is gathered independently from various outlets, such as the Internet, or friends and family.

Coping styles and strategies have frequently been subdivided into two broad categories (Folkman, Lazarus, Gruen, & DeLongis, 1986). The first involves problem-focused coping, whereas the latter entails emotion-focused coping and includes such behaviours as self-controlling, distancing, seeking social support, escape-avoidance, accepting responsibility and positive reappraisal (Folkman et al., 1986). Other investigators have divided emotion-focused coping into those that entail emotional approach versus emotional avoidance, as these may have different implications for well-being (Stanton & Franz, 1999). Carver (2000) identified wishful thinking, escapist fantasies, denial, turning to alcohol, and overeating as examples of emotional avoidance. Behaviours such as emotional expression, emotional processing, acknowledging and validating feelings, and expressing emotions are examples of emotional approach

(Stanton & Franz, 1999). Additionally, there may also be coping strategies that might not fall comfortably within any one particular strategy (e.g., prayer, see Ysseldyk, Matheson & Anisman, 2010).

It has been suggested that emotion-focused coping is utilized to a greater degree than problem-focused coping in relation to health stressors, as these situations require the management of anxiety, fear, dread, and concern regarding interpersonal relationships (Folkman & Lazarus, 1980). Furthermore, emotion-focused coping tends to be used in situations where the individual appraises the situation as being one over which they have no control (Folkman & Lazarus, 1980). In contrast, problem-focused coping is often more effective when stressors are presented that can be altered, such as rehabilitation after an injury (Folkman & Lazarus, 1980). A meta-analysis across a range of illnesses have supported the notion that individuals who perceived themselves to have control over their disease are more likely to endorse problem-focused coping, and those who felt they lacked control were more likely to utilize emotion-focused coping (Hagger & Orbell, 2003). Indeed, variations in individuals' appraisals of their control over cancer has been related to differing coping strategies such that individuals who viewed their cancer to be a challenge for them to overcome were more likely to use problem-focused or emotional approach coping, and those who viewed a cancer diagnosis as something that causes harm and/or loss were more likely to utilize emotional avoidance coping (Franks and Roesch, 2006; Orbell, O'Sullivan, Parker, Steele, Campbell, & Weller, 2008b). Thus, it should not be surprising to find that the coping strategies used to deal with the threat of H1N1, might be directly related to the perceived control an individual feels over whether or not they will contract the illness. In this regard, vaccination may have provided an

individual with a great sense of control, as this was promoted to minimize one's chances of contracting the swine flu virus (Ontario Ministry of Health and Long Term Care, 2009). Alternatively, the controversy surrounding vaccine safety may have lead one to feel as though the entire situation was uncontrollable, as no single action appeared to be the correct decision.

Across a variety of stressors, such as Huntington's disease (Helder, Kaptein, van Kempen, Weinman, van Houwelingen, & Roos, 2002), breast cancer (Carver et al., 1993), and epilepsy (Kemp, Morley, & Anderson, 1999), the use of emotion-focused coping has frequently been associated with elevated levels of depressive symptoms and poorer outcomes, whereas problem-focused coping has been linked to positive affect (Anisman, Merali, & Hayley, 2008; Ben-Zur, 2009). Thus, it has often been considered that problem-focused coping is adaptive, whereas emotional oriented coping is maladaptive. Although emotion-focused coping has often been portrayed as being an ineffective and even counterproductive strategy, Stanton and Franz (1999) suggested that under some conditions emotion-focused coping might actually be beneficial. An examination of women with breast cancer using emotion expressive coping at baseline revealed that three months later they were less likely to have medical appointments regarding cancer-related morbidities, had enhanced self-reported physical health, greater vigour, and experienced less distress than women who reported that they used less emotion-focused coping at baseline (Austenfeld & Stanton, 2004). Emotion-focused coping was also found to be used when individuals in a stressful situation were not provided with a significant amount of informational support (Dunkel-Schetter, Folkman, & Lazarus, 1987). This suggests that when individuals are not fully informed of the

risks, symptoms, and outcomes of disease, they may use emotion-focused coping to deal with the overwhelming feelings associated with the uncertainty of the diagnosis and the preventative behaviours that can be utilized.

Thus, there appears to be a cyclical relationship wherein the engagement of recommended health behaviours might serve as a coping strategy, and thus serve to limit the spread of disease (Brug, Aro, & Richardus, 2009). Yet, the engagement in these behaviours may also be dependent on the risk individuals perceive (Leppin & Aro, 2009), which may be influenced by the trust they have in media sources promoting the endorsement of preventative actions. The trust in the information obtained from the media sources may predict the coping strategies endorsed to deal with the threat of an illness. Indeed, coping was found to be significant predictor of other H1N1-related behaviours (e.g., staying home when sick; Teasdale, Yardley, Schlotz, & Michie, 2011) and as such, vaccination may also be used as, or predicted by, coping strategies.

Vaccination. Health models have typically predicted that high perceptions of risk are directly related to increased engagement in avoidance behaviours (e.g., health belief model), and indeed several studies revealed that increased perceptions of risk, susceptibility, and severity, were predictive of greater vaccination rates (Brewer, Weinstein, Cuite, & Herrington, 2004; Brewer, Chapman, Gibbons, Gerard, McCaul, & Weinstein, 2005). Examples of this have also been found in relation to H1N1 as anxiety and high perception of risk were found to be associated with the use of active (e.g., wearing a face mask) and avoidant (e.g., less use of public transit) behaviours (Goodwin et al., 2010; Jones & Salathe, 2009; Rubin et al., 2009), whereas risk uncertainty and disbelief in media reports were associated with low engagement in avoidant actions

(Rubin et al., 2009). However, contradictory results have also been reported in this regard. Specifically, a high perception of risk can promote the adoption of strategies to minimize infection, but it can also lead to feelings of helplessness and greater passivity in dealing with the threat (Leppin & Aro, 2009). It also appears that irrespective of their own risk perceptions, individuals may engage in preventative behaviours in line with social norms and the desire to avoid being perceived as putting others at risk (Leppin & Aro, 2009). However, when the risk is uncertain, individuals may endorse an omission bias where they choose the risks of passive non-action over the smaller risk of action, as an act that causes harm is considered morally worse and leads to greater regret than a choice not to act which also causes harm (Ritov & Baron, 1990). To be sure, participants were more likely to endorse declining a vaccine that had potentially harmful side effects, than to endorse vaccination, even when the risk of death from the illness was greater than the chance of developing side effects from the inoculation (Ritov & Baron, 1990). As such, individuals may not be willing to perform recommended behaviours if they are orthogonal to constructs important to their self-beliefs. By example, individuals were not willing to recognize the risk of, or prepare for, a natural disaster when these recommendations required them to conceptualize their primary place of security (their home) as a place where harm could occur (Harries, 2008).

In regard to swine flu, the most prominent preventative behaviour endorsed by health officials was the H1N1 vaccine. However, the inoculation was surrounded by controversy regarding both safety and availability. Those who wished to be vaccinated met exceptionally long delays that were widely portrayed by news outlets, as were stories questioning the safety of the production and the side effects of the vaccine. Questions to

the validity of the pandemic were exacerbated by reports that government agencies may have reacted to the pandemic in their own best political and economic interest, instead of prioritizing that of its citizens (Gostin, 2009). Alternative media sources cited facts directly contradicting that of the government and the World Health Organization, and proposed that the pandemic was a conspiracy created by pharmaceutical companies and government agencies to increase profits through the widespread dissemination of an unsafe vaccine (CBC News, 2010; Larson & Heyman, 2010). In view of the ambiguous threat of H1N1 on one side, and the potential mistrust of the government and media on the other, it might not be surprising that a great number of individuals were hesitant to receive the H1N1 vaccine.

The Present Studies

Given the ambiguous nature of potential health threats, the present studies were conducted to identify specific factors that determine personal evaluation of risk, and incorporated individual difference variables, such as the ability to tolerate uncertainty and perceptions of illness. Correspondingly, we also assessed the likelihood of individuals to take measures to reduce risks. In this regard, focus was placed on the factors that governed whether or not individuals would opt for vaccination in the face of a threat that comprised a potential pandemic (i.e., H1N1). Additionally, we assessed the contribution of trust in government and in media to promote individuals' responses to health threats, as a greater understanding of the public's perception of health risks has important implications for the communication of preventative information by public health agencies. Along these lines, we wished to further determine how individuals differentially appraise and cope with various illness (e.g., those that are either novel or

familiar, acute or chronic); and the impact of media attention on these distinctions.

Furthermore, we assessed the various media sources used to obtain health information (e.g., newspaper, Internet), as this may be indicative of the effort individuals are willing to put forth to protect their health. Understanding how individuals appraise an ambiguous health threat, as well as the influence of the media in this regard, may be important in ensuring psychological adjustment to a pandemic-like crisis.

Chapter 2: Study 1: The 2009 H1N1 Influenza Pandemic: The Role of Threat, Coping, and Media Trust on Vaccination Intentions in Canada

The purpose of this study was to examine the Canadian public's concurrent reactions to the H1N1 pandemic, such as their impressions of the severity and susceptibility to the threat, as well as their attitudes toward vaccination and protective health behaviours. Moreover, we examined the trust reported by the public in both government health agencies and medical health professionals. It was of interest to determine if respondents believed these agencies were sufficiently knowledgeable about, and capable of dealing with, the H1N1 threat.

On April 25, 2009 the World Health Organization (WHO, 2009) declared the H1N1 swine flu a public health emergency of international concern. It will be recalled that to a greater extent than earlier fears (e.g., mad cow disease, West Nile disease), the threat of H1N1 resulted in the mobilization of government agencies to provide inoculation for individuals. Within Canada, as well as other Western countries, only a modest portion of the population was vaccinated against H1N1 despite widespread government and media efforts to encourage individuals to do so (Rachiotis, Mouchtouri, Kremastinou, Gourgoulialis, & Hadjichristodoulou, 2010; Schwarzingger, Flicoteaux, Cortarenoda, Obadia, & Moatti, 2010; Statistics Canada, 2010). The present investigation was undertaken to assess the contribution of several psychosocial factors in determining intent to be vaccinated.

Media Influence on Appraisals of Risk

It is thought that individuals' behavioural responses to threatening situations are largely influenced by their appraisals of the potential stressor and the coping methods

used to deal with events appraised as stressors (Folkman & Lazarus, 1980). These appraisals are dependant on the information provided by public health agencies. Transparency about what is known, and that which is not known in relation to viral disease is critical to establish trust in government and media (Larson & Heymann, 2010), whereas distrust is increased by contradictory or missing information and by opposing opinions (Jones, Waters, Holland, Bevins, & Iverson, 2010). When a health threat, such as a novel flu strain appears, medical officials may not have all the answers to communicate to the public. This may leave government agencies to navigate the fine line between minimizing and catastrophizing concern regarding health threats. Indeed, when H1N1 first appeared, health agencies had little information concerning how severe the potential pandemic would be but were nonetheless called upon to make informative statements in this regard (Sandman, 2009).

The actions taken by individuals (e.g., wearing face masks, hand washing) might be dependent on how severe or imminent the risk of infection is perceived to be (Brug, Aro, & Richardus, 2009; Leppin & Aro, 2009). However, as already indicated, the actions of individuals take in this regard might be greatly affected by the trust they have in the validity of the information provided by government agencies and particularly the media which largely disseminates this information. It had previously been reported that when asked about a potential flu pandemic, only 60% of respondents indicated that they trusted the government to have priorities consistent with the needs of the general public, and less than 50% were confident in the government's abilities to actually handle a pandemic (Paek, Hilyard, Freimuth, Barge, & Mindlin, 2008). In a study of the avian flu conducted in 2006, participants recalled mad cow, SARS and Y2K, indicating that public

health concerns were overblown and thus these ‘imminent’ threats were no longer taken to heart (Elledge et al., 2009). In this regard, the Centre for Disease Control’s (CDC) early reaction to avian flu was cited as being blunted as the government had ‘exhausted its quota of scary utterances’ following September 11th and the Iraq and Afghan wars (Sandman, 2009).

H1N1 Vaccination

It will also be recalled that several factors seemed to converge to limit the success of the H1N1 inoculation program. Specifically, production of a vaccine was slow, insufficient vaccine was available for all individuals, administration of the vaccine involved long waits, and many individuals were concerned about the safety of the H1N1 vaccine due to questions of adequate testing, and previous memories of side effects such as Guillain-Barre Syndrome, and questions of the motivation behind creating the vaccine (Ferguson, Ferguson, Golledge, & McBride, 2010; Gostin, 2009; Larson & Heymann, 2010; Maltezou et al., 2010; Thoon & Chong, 2010). Each of these issues might have influenced appraisals of H1N1 as a threat, and correspondingly individuals’ intention to be vaccinated might have been related, directly or indirectly, to trust of media reports. In view of the ambiguous threat of H1N1 on one side, and the potential mistrust of the government and media on the other, it might not be surprising that a great number of individuals were hesitant to receive the H1N1 vaccine.

In light of the multiple uncertainties regarding viral threats, it was hypothesized that individuals who did not think the pandemic was a serious threat or who did not trust the media, would indicate low chances of contracting H1N1, and would not indicate any intention to be vaccinated. It was also hypothesized that individuals who endorsed

problem-focused coping would be more likely to receive vaccination, compared to those individuals who utilized emotion-focused coping to deal with the threat of H1N1.

Method

Participants

Participants comprised 748 women (72.83%) ranging in age from 18 to 67 ($M = 32.37$, $SD = 10.23$ years) and 279 men (27.17%), aged 18 to 76 ($M = 31.08$, $SD = 10.38$ years), living in Canada. Further demographic information is presented in Table 1.

Procedure

Data were collected online from October 8 to November 29, 2009, following study approval by the Carleton University Ethics Committee for Psychological Research. Participants provided informed consent by clicking the appropriate online button after reading the consent statement (Appendix A). Participants then created an ID and password that was used to identify their data. All on-line responses were verified for validity through a multi-step procedure including (a) ensuring that the Internet Protocol address did not appear more than once in the submissions, (b) excluding data if the participant completed the survey in less time than was possible to read and answer all questions, and (c) verifying that answers to pre-identified items elicited a coherent pattern of responses. Upon completion of the questionnaires, participants received a debriefing and were provided with contact information for government health agencies in the event that they felt they needed assistance (Appendix B).

Table 1.

Demographic information (%) as a function of gender.

	Female (n = 748)	Male (n = 279)
<i>Ethnicity</i>		
Euro-Caucasian	62.52	48.39
Asian/South Asian/South East Asian	25.97	39.43
Other e.g., Arabic, Black, Aboriginal	11.51	12.19
<i>Religion</i>		
Protestant	26.87	22.22
Catholic	26.47	26.52
Jewish/Muslim/Buddhist/Hindu/Sikh	20.86	19.36
Atheist/Agnostic	25.80	31.90
<i>Education</i>		
High School	14.17	10.39
Some College/University	20.32	21.86
Trade or College Diploma	23.80	22.22
University Degree	41.71	45.52
<i>Employment</i>		
Full Time	47.79	60.57
Part Time	23.16	12.55
Retired/Not Employed	29.05	26.88
<i>Income</i>		

Under 30,000	18.52	13.36
30,000-59,999	31.14	31.41
60,000 or more	50.34	55.23
<i>Population of Area of Residence</i>		
Large (1 million or more)	29.76	40.14
Medium (100,000 – 999,999)	41.82	40.14
Small (10,000-99,999)	16.22	13.26
Rural (less than 9,999)	12.20	6.45

Measures

Specific questions measured respondents' knowledge of H1N1, perceptions of the symptoms of H1N1, transmission and severity of the virus, worry about contracting H1N1, actions to minimize their chances of contraction, as well as the trust they had in the media, and in their physician, to communicate information regarding H1N1. Individuals also indicated whether they had, or were intending to get the vaccine (yes), were definitely not getting the vaccine (no), or were undecided about their vaccination intentions (unsure). Both those individuals who were intending to be vaccinated, and those who had received the inoculation, were evaluated as a single group who said 'yes' to vaccination. The vaccine was not available in Canada at the outset of the study, and then had priority allocations to pregnant woman and children once it was available, therefore we did not want to differentiate between those who had received the vaccine and those intending to get the vaccine, as we could not be sure which factors were contributing to completion of the inoculation. All H1N1 related questions were created specifically for the present study and those of particular relevance are presented in Tables 2-5, or are described within the text. Unless otherwise specified, questions were rated on a five-point likert scale or a yes/no format (Appendix C).

Survey of coping profiles endorsed. This questionnaire assessed the strategies individuals used to cope with their fear of contracting H1N1 (Matheson & Anisman, 2003; Appendix D). Over a questionnaire of 50 items, individuals indicated how often they used particular coping strategies from zero (never) to four (almost always). A principal component analysis with a varimax rotation was performed, as well as interpretation of a scree plot, to determine the factors this scale could be organized along.

Items were included on a factor when loadings were greater than 0.40. Emotion-focused coping comprised rumination, wishful thinking, emotional containment, emotional expression, self blame, other blame, and cognitive distraction (Cronbach's $\alpha = 0.92$). Problem-focused coping comprised problem solving, social support seeking and cognitive restructuring (Cronbach's $\alpha = 0.86$). Avoidance coping comprised active distraction, humour, and passive resignation (Cronbach's $\alpha = 0.64$).

Results

Four sets of analyses were performed. The first reflected knowledge and perceptions of severity of H1N1; the second utilized ANOVA and multiple linear regression to examine predictors of H1N1 self contraction estimates; the third employed multinomial logistic regression and chi square to assess predictors of the intent to be vaccinated; and the fourth utilized chi square analyses to address the relationship between both the trust in media and trust in physician in regard to intentions to be vaccinated.

Knowledge of H1N1 Symptoms, Contraction, Transmittance

For each of the descriptive variables, gender differences were non-significant or accounted for less than 1% of the variance and thus all analyses were performed encompassing the entire sample. Knowledge of H1N1 was moderate ($M = 3.19$, $SD = 0.88$), with the majority of respondents correctly identifying the symptoms of H1N1 (e.g., fever - 89.39%, chills - 53.75%, cough - 61.73%) as described by the Public Health Agency of Canada (2009). Overall, respondents believed that the threat of H1N1 was limited. Indeed, as shown in Table 2, a large proportion of respondents believed that

Table 2.

Percentage of respondents indicating their expectancy concerning the severity of H1N1 spread in Canada.

Less than 10% of the Canadian population will be infected	36.51
10% of the Canadian population will be infected	29.70
25% of the Canadian population will be infected	24.34
50% of the Canadian population will be infected	7.40
H1N1 will be a severe and deadly pandemic in Canada	0.97
Other (e.g., unsure, depends on vaccine)	1.07

10% or less of the population would contract H1N1, and less than one percent believed that H1N1 would be severe and deadly. Commensurately, levels of worry regarding H1N1 were moderate ($M = 2.38$, $SD = 1.11$), although respondents indicated that their worry would increase once a single person they knew contracted the illness (Table 3). Individuals also expressed a degree of invulnerability, as they predicted that it was more likely for a close friend to contract H1N1 ($M = 45.60\%$, $SD = 23.93$), than it was for themselves to become ill ($M = 38.10\%$, $SD = 22.88$), $t(1024) = -14.26$, $p < .01$. They also believed that if they were to contract H1N1, it was likely that they would transmit it to someone else, and that the symptom severity in the newly infected person ($M = 2.73$, $SD = 0.97$) would be greater than their own ($M = 2.45$, $SD = 0.87$), $t(1025) = -10.76$, $p < .01$ (Table 4).

Despite the belief that H1N1 would not be widespread, and believing that their own chances of contracting H1N1 were low, respondents indicated that they generally adopted behaviours to limit contracting H1N1. Specifically, respondents reported that they consciously *avoided* physical greetings (44.60%), confined spaces (44.11%), contact with inanimate objects (48.39%), public transportation (42.06%), and exposure to high risk individuals (45.57%). They also indicated that they frequently *engaged* in washing their hands (97.47%), using hand sanitizer (74.59%), and cleaning common surfaces (59.01%) to limit H1N1 infection.

Predictors of H1N1 Self Contraction Estimates

It was of interest to determine which of the beliefs pertaining to H1N1 were factors related to perceptions of self-contraction risk. A multiple linear regression

Table 3.

Percentage of respondents indicating the point at which they would be concerned about contracting H1N1.

When at least one person I know contracts H1N1	33.89
When more than one person I know has contracted H1N1	25.02
When 10% of the Canadian population is infected	10.32
When 25% of the Canadian population is infected	10.94
When 50% of the Canadian population is infected	6.72
When the government declares a pandemic in Canada	6.52
Never	3.31
Other (e.g., I'm already worried; when someone I know dies)	3.31

Table 4.

Percentage of respondents indicating the severity of symptoms if H1N1 was contracted by themselves or an individual to whom they might transmit the illness.

Severity of Symptoms	In self	In individual to whom you transmit H1N1
Very mild. I could just stay home and catch up on stuff.	7.80	5.45
Like a normal flu. I would stay in bed for a few days and take care of it.	53.80	43.14
Serious. Would put me out of commission for at least a week.	25.93	28.82
Very serious. Would feel extremely ill, and would need to seek medical help.	10.14	17.82
Extremely serious. Life-threatening.	2.34	4.77

analysis indicated that neither age nor income, were significant predictors of the individuals' perceived risk of H1N1 contraction, $F(2, 1016) = 2.62, ns$. In contrast, an ANOVA revealed that beliefs regarding self-contraction were significantly greater among individuals living in a rural area ($M = 44.60\%, SD = 23.14$) as compared to living in a medium ($M = 36.10\%, SD = 21.84$), $p < .05$, or large sized city ($M = 37.80\%, SD = 23.51$), $p < .05$, $F(3, 1019) = 4.27, p < .01, \eta^2 = 0.010$. A second multiple linear regression analysis examining H1N1 predictors revealed that worry about the disease, $B = 0.45, p < .01$, chances of a close friend contracting the illness, $B = 0.63, p < .01$, and time¹, $B = -0.01, p < .05$, were significant predictors of the perceived risk of H1N1 contraction, $F(4, 978) = 349.01, p < .01, adjusted R^2 = 0.586$, whereas knowledge about H1N1 was unrelated to self contraction estimates. Finally, neither trust in one's physician, $F(4, 1018) = 2.28, ns$, nor trust in the media, $F(4, 1019) = 2.61, ns$, was related to self-contraction estimates.

Predictors of H1N1 Vaccination Intentions

Equal proportions of the sample were either intending to be or had been vaccinated (30.12%), were not going to be vaccinated (34.89%), or were unsure about their decision (34.99%). These proportions neither differed with gender, $\chi^2(2) = 1.27, ns$, nor the population of the area in which participants lived, $\chi^2(6) = 10.48, ns$. Although the proportion of individuals that had decided against H1N1 vaccination was considerable, in comparison, a much larger proportion of the sample had decided against receiving the

¹ Time (from the start (October 5, 2009) of data collection to its last day (November 29, 2009)) was treated as a continuous variable in order to account for alterations in perceptions of H1N1 as the pandemic progressed.

seasonal flu shot (52.44%); whereas approximately one quarter reported obtaining, or planning to obtain, the seasonal flu shot (28.36%), and the remainder were undecided (19.20%). Again these intentions did not differ between males and females, $\chi^2(2) = 2.47$, *ns*.

In order to assess the predictors of H1N1 vaccination intentions, independent variables were grouped according to theoretical relevance so that one multinomial logistic regression was run for demographic predictors, and one for H1N1 related predictors. An analysis of the odds ratio of intending to be vaccinated relative to not being vaccinated indicated that both age and income were significant predictors of intent, $\chi^2(4) = 19.49$, $p < 0.01$, Nagelkerke $R^2 = 0.021$. Specifically, as age, $Exp(B) = 1.024$, $Wald(1) = 9.72$, $p < .01$, and income, $Exp(B) = 1.10$, $Wald(1) = 6.16$, $p < .05$, increased, so did the intent to be vaccinated. These variables were not predictive of individuals being undecided.

Additionally, perceptions regarding H1N1 were significant predictors of respondents indicating that they definitely planned to be vaccinated, $\chi^2(10) = 171.25$, $p < .01$, Nagelkerke $R^2 = 0.180$. Specifically, the chances of a close friend contracting H1N1, $Exp(B) = 1.17$, $Wald(1) = 8.53$, $p < .01$, worry about H1N1, $Exp(B) = 2.43$, $Wald(1) = 79.66$, $p < .01$, and time, $Exp(B) = 1.01$, $Wald(1) = 4.11$, $p < .05$, were all accompanied by individuals being more likely to be vaccinated relative to those who did not have this intention. Unexpectedly, the odds of an individual indicating that they would be vaccinated were not significantly related to perceived self-contraction risk, or knowledge about H1N1.

Being uncertain about being vaccinated (in contrast to definitely not being vaccinated) was also elevated in direct relation to H1N1 worry, $Exp(B) = 1.83$, $Wald(1) = 41.94$, $p < .01$; and predictably, with the passage of time, participants were less likely to be unsure about their attitudes towards vaccination, $Exp(B) = 0.99$, $Wald(1) = 4.47$, $p < .05$. However, H1N1 knowledge, perceived risk of self-contraction, and close friend contraction were not predictive of individuals being unsure about vaccination.

Additionally, a chi square analysis revealed that an individuals' predicted severity of the H1N1 pandemic was related to their attitudes towards vaccination, $\chi^2(6) = 67.30$, $p < .01$. Among those participants who believed that the H1N1 pandemic would affect less than 10% of the population, 47.5% of participants indicated that they were not planning to be vaccinated, 34.4% were undecided and 18.1% supported vaccination. As estimates of H1N1 severity increased, so did the intention to be vaccinated, such that among those that predicted 50% of the population would be infected, 50% of respondents indicated that they would be vaccinated.

A MANOVA examining gender differences in coping strategies endorsed revealed that women endorsed problem-focused coping ($M = 3.15$, $SD = 0.81$) to a greater extent than did men ($M = 2.93$, $SD = 0.81$), $p < .001$, $F(1, 1025) = 14.94$, $p < 0.05$; though this difference accounted for a very small amount of variance, $partial \eta^2 = 0.014$. Neither emotion-focused coping (*female* $M = 2.45$, $SD = 0.85$; *male* $M = 2.43$, $SD = 0.80$) nor avoidance coping (*female* $M = 2.97$, $SD = 0.64$; *male* $M = 2.96$, $SD = 0.63$) differed by gender, F 's(1, 1025) = 0.23 and 0.01, *ns*, respectively. As such, for all further analyses gender was collapsed. Finally, coping strategies used to deal with the fear of contracting H1N1 were significantly related to vaccination intentions, $\chi^2(6) = 20.40$, $p <$

.01, Nagelkerke $R^2 = 0.02$. Drawing on problem-focused coping was significantly related to intending to, or receiving, the H1N1 vaccination, as opposed to having no intention to be vaccinated, $Exp(B) = 1.56$, $Wald(1) = 13.22$, $p < .001$. Whereas the use of avoidance coping was related to individuals being less likely to say 'yes' to vaccination, $Exp(B) = 0.65$, $Wald(1) = 7.80$, $p < .01$. Similarly, the utilization of problem-focused coping predicted individuals being significantly more unsure about vaccination intentions, $Exp(B) = 1.31$, $Wald(1) = 5.38$, $p < .05$; whereas the endorsement of avoidance coping was related to individuals being less likely to be unsure about their vaccination attitudes, $Exp(B) = 0.69$, $Wald(1) = 6.32$, $p < .05$. The endorsement of emotion-focused coping did not play a role in any aspect of vaccination intentions. In effect, it seems that those individuals that engaged in problem-focused coping were 56% more likely to support being vaccinated, as opposed to saying they would not, whereas avoidance-focused coping was associated with individuals being 35% less likely to indicate that they would be vaccinated.

Trust in Relation to Vaccination Intent

In general, respondents trusted the media to provide accurate information regarding H1N1; however, as indicated in Table 5, they simultaneously felt that the information was either sensationalized or confusing. Moreover, fully one-third of respondents reported that they did not trust the media. In contrast, respondents overwhelmingly trusted the accuracy of the medical advice received from their doctor (Table 5). Trusting the media was generally related to individuals intending to be vaccinated against H1N1 or being unsure about their choice, whereas among those who

Table 5.

Percentage of respondents indicating their trust in the media/doctor regarding H1N1 (% agree) and their vaccination intention.

<i>Trust in Media to convey accurate information</i>	% agree	<i>Vaccination Intention %</i>		
		Yes	No	Unsure
Yes, I believe the media reports would be true	9.06	43.50	19.60	37.00
Yes, but I believe it would be a little sensationalized	35.97	35.50	28.50	36.00
Yes, but I believe it would present contradictory or confusing information	19.30	34.80	21.70	43.40
No, the media reports would dramatize H1N1	32.55	19.80	50.90	29.30
No, I don't believe anything the media reports	3.12	6.30	68.80	25.00
<i>Trust in Physician to convey accurate information</i>				
Yes, but I believe that my doctor would be downplaying the situation	6.15	30.20	25.40	44.40
Yes, I believe what my doctor tells me to be true	77.85	32.70	32.90	34.40
Yes, but I believe my doctor would embellish the situation	9.95	13.70	49.00	37.70
No, my doctor would be too dramatic about H1N1	1.85	21.10	57.90	21.10
No, I don't think my doctor would be knowledgeable about H1N1	4.20	23.30	41.90	34.90

did not trust the media, a majority of respondents had no intention of being vaccinated, $\chi^2(8) = 92.10, p < .01$ (Table 5).

Similarly, it appeared that trust in the physician was related to participant's vaccination intentions, $\chi^2(8) = 26.91, p < .01$. Among individuals who trusted their physician, equal proportions indicated that they would, would not, or were undecided about being vaccinated. Individuals who trusted their physician, but with a qualification (downplaying, embellishing), were likely to indicate that they did not intend to be vaccinated, or were undecided. Finally, those who distrusted their physician were most likely to indicate that they did not plan to be vaccinated (Table 5).

Discussion

As of July 19, 2010, it was estimated that less than half of the Canadian population had been vaccinated for H1N1 (Statistics Canada, 2010), despite the extensive media coverage of the potential danger of the illness. The present investigation was undertaken to determine factors that influenced threat perceptions regarding H1N1, as well as factors that might have contributed to whether or not individuals chose to be vaccinated.

As in other situations involving risk assessment (Halpern-Felsher et al., 2001), it seemed that respondents had a sense of invulnerability. Specifically, respondents believed they were less vulnerable to infection than their friends, and also believed that if they were infected, their symptoms would be less severe than that of their friends. Although such a sense of invulnerability is usually thought to be most common among relatively young individuals (adolescents or college-age; Cohn, Macfarlane, Yanez, & Imai, 1995), this profile of invulnerability was evident across all ages in the present

investigation. Of the various factors that have been offered as contributing to a sense of invulnerability (e.g., age, habit/routine; Bernecker, 2010), one that may be particularly pertinent is that of prior exposure to a trauma (Millstein & Halpern-Felsher, 2002; Thompson, Kyle, Swan, Thomas, & Vrungos, 2002). Specifically, it is thought that previous adverse experiences with a particular threat sensitizes individuals so that they are less likely to have a sense of invulnerability, at least with respect to similar threats (Greening & Dollinger, 1992). Thus, it might be instrumental to contextualize the H1N1 threat given that there have been several threats in recent years (e.g. avian flu, SARS), which essentially did not materialize as widespread as they might have been (or had been expected). For instance, perceptions of the previous, though less serious, threat of avian flu revealed that more than 50% of respondents thought the flu was likely to affect them and 71% thought that if an epidemic were to occur it was likely to have severe effects (Paek et al., 2008). This was very different from the responses obtained regarding the H1N1 pandemic, and is consistent with the view that respondents were expressing fatigue regarding repeated threats. Essentially, previous “cries of wolf” might have desensitized individuals’ responses to warnings. This perspective was reinforced by the finding that respondents indicated that if just one person they knew contracted H1N1, then their concern would increase. Fundamentally, such an event would bring the threat close to home and thus dispel the myth of H1N1 being another false alarm. In line with this perspective, worry about H1N1 contraction was predictive of individuals’ perceived chances of contracting the illness and whether they intended to be vaccinated.

In the face of a pandemic (particularly one in which detailed statistics are unavailable) risk appraisals might be emotion based, as opposed to being rationally and

cognitively based (Leppin & Aro, 2009). The data of the present investigation suggested that most individuals were fairly knowledgeable about the symptoms of H1N1, but thought that the pandemic would not be severe, despite repeated media reports to the contrary. In this regard, two thirds of respondents indicated that they believed that fewer than 10% of individuals would contract the illness. Individuals' perceived chance of contracting H1N1 did not predict an intent to be vaccinated, possibly reflecting the finding that even those who believed they might contract the virus generally believed that the severity of the disease would be limited. Furthermore, during the course of the study there were numerous media reports concerning the safety of the vaccine given the rush for production. Such reports left many individuals leery about the vaccine's safety (Maltezou et al., 2010; Thoon & Chong, 2010), and for some the risk of contracting H1N1 might have been a smaller one than that of vaccination itself. The extent to which this might have influenced inoculation rates could not be determined given that the study had been ongoing at that time, and could hence could not be altered.

As expected, the inclination towards vaccination was related to the coping strategies that individuals had endorsed regarding their fear of H1N1 contraction. In general, individuals that favoured problem-focused coping were more likely to indicate that they would be vaccinated, although a substantial portion was uncertain. In contrast, those who endorsed an avoidant-focused strategy were more likely to indicate that they intended not to be vaccinated, and were less likely to be uncertain about this intention. It has frequently been considered that problem-focused coping is a functionally more adaptive strategy than is emotion-focused coping (Matheson & Anisman, 2003). As it was uncertain how severe or widespread H1N1 would become, it might be considered

that problem-focused coping was the more effective strategy given its relation to vaccination intent. Yet, as the safety of the vaccine might not have been fully determined, it is actually unclear whether choosing not to be vaccinated was the more practical decision.

Despite the importance of the media in providing essential information to the public, it has been suggested that different pressures and motives influence what information is transmitted (Elledge et al., 2008; Jones et al., 2010). Commensurately, a majority of individuals in the present study believed media reports, but indicated that the media would sensationalize or present contradictory information. Indeed, a sizeable minority of respondents indicated that they distrusted the media, often because the information received was dramatized. The importance of media trust was particularly notable in relation to vaccination attitudes. Specifically, as trust decreased, so did the intention to be vaccinated, and when respondents found information provided by the media to be confusing, they were more likely to be uncertain about vaccination. In contrast to the limited trust in the media, most individuals reported trusting their physician to communicate accurate information regarding H1N1. To be sure, the number of respondents who felt mistrustful of their physician was relatively small, but accounted for a sizeable number of respondents (6%). As infrequent as mistrust might have been, when respondents did not trust their physician, or when their trust was compromised by feeling that the physician was dramatizing or embellishing the threat, the intention to be vaccinated was lower than when trust existed.

Notwithstanding the relative mistrust of the media concerning H1N1 reports in the present investigation, in other situations (e.g., combination childhood vaccinations)

trust of the media was reported to exceed that of health professionals, government and agencies responsible for vaccine research (Brown et al., 2010). Further to this, it has been suggested that by rejecting the notion of ‘trusting blindly’ individuals were able to feel empowerment once they had taken personal control over decision making (Hobson-West, 2007). In relation to other situations involving medical uncertainty (e.g., hormone replacement therapy and oophorectomy in BRCA⁺ women), due to the frustrations stemming from a perceived lack of physician knowledge, coupled with inconsistent and contradictory media reports, women were most likely to seek information from other individuals in similar situations who were trusted as they formed a high degree of community (Kenen, Shapiro, Friedman, & Coyne, 2007). It is uncertain why mistrust and caution was as great as it was concerning H1N1 media reports relative to that evident in other situations, and why trust of physicians was as high as it was in the present investigation. Although each of these situations involved stressful situations with an ambiguous component, there might also have been distinct differences in the severity and imminence regarding the potential threat. In each case, trust was an essential component that governed decision making, but the studies differed primarily in whom individuals trusted.

Several limitations of the present study warrant consideration. Specifically, the respondents represent a self-selected sample, and as such these individuals might have been attracted to the study due to a heightened interest in H1N1. Furthermore, the findings were correlational and hence directionality of these relations is uncertain. That is, although trust may have influenced vaccination decisions, it is equally possible that intention not to be vaccinated may have influenced trust in the media or reflected a

rationalization involving information provided by the media. Finally, as the present investigation was cross sectional, it is uncertain how individuals behaved over time, and whether intentions to be vaccinated were acted upon. Likewise, the final vaccination decisions of those who were uncertain are not known. As the eventual vaccination rate was 41% in Canada (Statistics Canada, 2010), whereas 33% of individuals had or intended to be vaccinated in the present investigation, it is likely that a fair portion of ‘undecided’ individuals ultimately opted for vaccination, and indeed our findings suggest that as time passed individuals were more likely to endorse vaccination.

Based on the results of the present investigation, several recommendations can be offered. Worry or concern about a potential pandemic was clearly related to whether individuals opted for vaccination. Yet, promoting worry is a strategy that could be counterproductive. Although difficult, navigating between such competing demands is necessary. However, so long as the general public does not trust the media to provide accurate information that neither sensationalizes nor diminishes information, public health agencies may encounter difficulty with adherence to their recommendations. It may be necessary for government agencies to communicate with the public through more direct channels, including government operated websites, television and radio networks.

The performance of government health agencies did not lend itself to people being vaccinated given the delay in the vaccine being prepared, the shortage of supply, persistent rumours regarding the safety of the vaccine, and ultimately the long lines endured to receive vaccination. Certainly the hurdles to receive vaccinations were counterproductive, and improved systems need to be in place to deal with such issues.

Finally, given the individual risk of contracting H1N1, the decision not to be vaccinated might well be viewed as rational irrationality (Caplan, 2001) or simply one of convenient inconvenience (e.g., I don't feel like going all the way to the clinic then standing in line), particularly when risk is not appraised as being serious. Enhancing trust in government agencies and in the media will be necessary for an effective program of vaccination to be established when a future threat presents itself.

Chapter 3: Psychological Implications of the H1N1 Pandemic

Due to the considerable media attention given to H1N1, and the pandemic level that viral transmission achieved, it was thought that members of the public would perceive the illness as a great threat and take the measures prescribed to protect themselves. However, appraisals of the H1N1 pandemic severity were relatively mild in Study 1, and less than half of respondents indicated that they had, or were planning to be, vaccinated. Yet, the psychological construct worry, played a significant role in this study. Individuals who reported greater levels of H1N1 worry believed they had a greater chance of contracting H1N1, and were more likely to be, or intended to be, vaccinated. Given these findings, in Study 2 we evaluated several factors that may have contributed to appraisals of, and reactions to, the H1N1 pandemic. Specifically, we examined the role of intolerance of uncertainty, appraisals of the pandemic (threat, stressfulness, self-control and other-control), and coping strategies (emotion- and problem-focused) in relation to the threat of H1N1. Furthermore, we determined whether the experience of the pandemic elicited psychological disturbances, particularly the levels of anxiety individuals felt in relation to the viral threat.

Study 2: The 2009 H1N1 Pandemic: Intolerance of Uncertainty, Appraisals, Coping and Anxiety

The recent threat of a swine flu (H1N1 virus) pandemic created considerable distress among some individuals, and yet others seemed not to be greatly affected and indeed did not take measures (e.g., vaccination) to prevent infection (Statistics Canada, 2010). While behavioural health theories often focus on the cognitive aspects of decision making during a threat, there are also emotional processes that may exhibit an effect on one's adjustment to a period of uncertainty. The present investigation was undertaken to examine the interplay between intolerance of uncertainty, appraisals, and coping in relation to anxiety associated with the threat of H1N1.

Threat Appraisals and Coping

In the face of a health threat there are three potential reactions to the situation: maintaining ignorance and denial of the threat, falling into despair, or taking control (Peter & Bot, 2009). These reactions are likely dependent on the appraised threat or risk associated with a particular illness. To a limited extent, there have been empirical assessments of the appraisals and coping responses to potential threats involving viral illnesses. By example, appraisals of avian flu threat were found to reflect considerable uncertainty as individuals were not well informed regarding avian flu and pandemic risk, nor were they aware of how to prepare for or respond to a pandemic (Elledge, Brand, Regens, & Boatright, 2008). Some participants indicated that there was no need to prepare because the U.S. was immune to catastrophe, or that a vaccine would be established in time to prevent widespread disease. Moreover, in other studies, inappropriate coping behaviours were used as a means of avoiding possible infection,

including discriminatory actions directed at particular groups. For instance, during the 1980's gay men experienced severe intolerance in association with the HIV crisis (Herek, 1999), and high levels of anxiety and perceived threat were predictive of greater avoidance of individuals of Asian descent in response to the 2002-2003 SARS outbreak (Puterman, DeLongis, Lee-Baggley, & Greenglass, 2009).

H1N1 Uncertainty

Leventhal's Common Sense Model (CSM) of health regulation (Benyamini, 2008) suggests that when confronted with a health threat individuals first establish an illness perception that involves the comparison between their current symptoms and those typical of the health threat. This comparison is informed by previous experiences with illness as well as information provided by external sources. In the case of H1N1, considerable ambiguity existed as it was often unclear which symptoms were unique to this particular virus, and how these symptoms differed from the common cold or seasonal flu. Moreover, the virulence of the illness was uncertain, as was the potential severity of the symptoms.

Thus, it was the aim of the present investigation to define the contribution of intolerance of uncertainty, appraisals and coping mechanisms in relation to anxiety associated with an uncertain health risk. It was hypothesized that since the appearance and the spread of H1N1 was ambiguous, anxiety would be related to individuals' intolerance of uncertainty. It was further hypothesized that an intolerance of uncertainty would predict how individuals appraised the risks regarding H1N1. These appraisals were expected to be related directly and indirectly (through coping strategies) to anxiety regarding H1N1.

Method

Participants

Individuals ($N = 1027$) over the age of 18 and living in Canada participated in this study. These participants, who were the same as those of Study 1, comprised women (72.83%) ranging in age from 18 to 67 ($M = 32.37$, $SD = 10.23$ years) and 279 men (27.17%) ranging in age from 18 to 76 ($M = 31.08$, $SD = 10.38$ years).

Procedure

The study was approved by the Carleton University Ethics Committee for Psychological Research. Participants were recruited from online classified websites (e.g., Craig's list) and data were collected online from October 8, 2009 to November 29, 2009 during the peak of the H1N1 pandemic. All participants provided informed consent (Appendix A) and received a debriefing form with contact information for public health agencies (Appendix B). Responses were verified for validity through a multi-step procedure including ensuring that the Internet Protocol address did not appear more than once in the data set, excluding data if the participant completed the survey in less time than was possible to read and answer all questions, and verifying that answers to pre-identified items elicited a coherent pattern of responses. Initially, 1586 individuals registered for the survey. 235 participants did not complete the study, and 324 were deemed invalid (owing to the time it took to complete the questionnaires, as well as questions that were included to assess validity of responses), resulting in the final sample size of 1027.

Measures

Intolerance of uncertainty. Participants completed 27 items on a five point scale ranging from one (not at all characteristic) to five (entirely characteristic) indicating how typical it was for statements to reflect how they felt (e.g., Uncertainty makes life intolerable) (Buhr & Dugas, 2002; Appendix E). A total score was calculated by taking the mean across all items (Cronbach's $\alpha = 0.96$).

Stress appraisal measure. Participants completed 28 items on a five point scale ranging from one (not at all) to five (extremely) indicating the accuracy of statements to reflect how they viewed the H1N1 pandemic at that current moment (e.g., Does this situation have serious implications for me?) (Peacock & Wong, 1990; Appendix F). Subscales measured stressfulness (Cronbach's $\alpha = 0.78$), threat (Cronbach's $\alpha = 0.79$), self-control (Cronbach's $\alpha = 0.85$), other-control (Cronbach's $\alpha = 0.88$), uncontrollability (Cronbach's $\alpha = 0.76$), centrality (Cronbach's $\alpha = 0.86$) and challenge (Cronbach's $\alpha = 0.70$). Subscale totals were calculated by taking the mean across the related items.

Survey of coping profiles endorsed. Similar to Study 1, coping strategies were measured using the SCOPE (Appendix D). However, in the interest of parsimony for the present analysis, and due to the somewhat low reliability of the avoidance factor in Study 1, a two factor solution was forced during factor analysis. The coping strategies could be grouped into emotion-focused coping (comprised of self-blame, other-blame, rumination, wishful thinking, emotional containment, emotional expression, cognitive distraction, and passive resignation, Cronbach's $\alpha = 0.90$) and problem-focused coping (comprised of problem solving, cognitive restructuring, social support seeking, active distraction, and

humour, Cronbach's $\alpha = 0.84$). Subscale total scores were calculated by taking the mean across the related items.

Self-evaluation questionnaire (state anxiety). Participants completed 20 items on a four point scale ranging from one (not at all) to four (very much) indicating which statements were most representative of how they felt about H1N1 in the current moment (e.g., I feel worried) (Spielberger, 1985; Appendix G). A total score was calculated by taking the mean across all items (Cronbach's $\alpha = 0.95$).

Statistical Analysis

A latent analysis with Structural Equation Modeling (SEM) was used to test the mediation hypotheses in one overall model. This approach permitted analysis of sequential mediation with multiple mediating variables, thus accounting for multicollinearity. In this way, it could be determined which appraisals and which coping strategies served as significant mediators, even after accounting for shared variance between these variables.

An a priori predictive model was specified to determine which pathways uniquely predicted anxiety after accounting for all of the mediating variables. The hypothesized model was then compared to three other alternative models in which a) no mediators were specified, b) only the appraisals were specified as mediating variables, and c) only coping strategies were specified as mediating variables. Model fit was evaluated using the Non-normed Fit Index (NNFI) and the comparative fit index (CFI), for which values greater than .90 are deemed acceptable (Pedhazur & Schmelkin, 1991), as well as the Root Mean Square Error of Approximation (RMSEA), for which values less than .08 are deemed acceptable (Brown, 2006). Although Chi Square measures of fit are sensitive to

sample size, the Minimum Fit Function Chi Square was also included as a fit index so that these values may be utilized to compare alternative models against the hypothesized model.

Indicators were parceled into sets of three when there were more than four indicators for each respective construct, allowing for a reduced number of parameters to be estimated (thus reducing stress on the data). Before parceling, all of the indicators associated with each construct were factor analyzed to ensure unidimensionality for the relevant constructs. An “item-to-construct balance” method of parceling was then used (Little, Cunningham, & Shahar, 2002, p. 166) by anchoring three parcels with the highest indicator loadings onto each of the clusters, and then balancing this with the lowest indicator loadings, and repeating this process until all of the indicators were represented in a cluster. The mean total of the indicators in the assigned cluster was then estimated and used as an individual indicator for the construct of interest. The items were parceled so that intolerance of uncertainty, as well as the coping strategies and H1N1 anxiety were clustered into three indicators loading onto to their latent factors.

Results

Descriptive Analyses

In general, there were few differences between male and female participants. On some measures, such as anxiety and stressfulness appraisals, females scored significantly higher than males, but in each instance gender accounted for less than one percent of the variance. Thus, the data for males and females were pooled. Due to the variability in the

daily media coverage surrounding the progression of the pandemic the influence of time² was also examined. None of the variance in the variables significantly differed over time.

Levels of intolerance of uncertainty were moderate, and anxiety related to H1N1 was somewhat below the midpoint (Table 6). Likewise, appraisals of H1N1 indicated moderate levels of perceived threat, stressfulness, challenge, uncontrollability and centrality, whereas perceptions of self- and other-control were somewhat greater. Furthermore, the endorsement of problem-focused coping to deal with the fear of H1N1 was moderate, but was endorsed slightly more frequently than was emotion-focused coping (Table 6).

² Time (from the start (October 5, 2009, day 1) of data collection to its last day (November 29, 2009, day 53)) was treated as a continuous variable in order to account for alterations in perceptions of H1N1 as the pandemic progressed.

Table 6.

Descriptive statistics (means, standard deviations) of measures with possible ranges indicated in parentheses.

	<i>M</i>	<i>SD</i>
Intolerance of Uncertainty (1-5)	2.42	0.82
<i>H1N1 Appraisals (1-5)</i>		
Threat	2.29	0.81
Stressfulness	2.23	0.79
Challenge	2.09	0.75
Centrality	2.57	0.92
Self-Control	3.48	0.88
Other-Control	3.46	0.93
Uncontrollability	2.00	0.78
<i>Coping (1-5)</i>		
Emotion-focused	2.50	0.78
Problem-focused	3.06	0.71
H1N1 Anxiety (1-4)	1.77	0.60

Anxiety was regressed simultaneously onto the appraisal dimensions and revealed that only greater levels of threat ($B = 0.18$, $SE = 0.31$, $p < .001$), stressfulness ($B = 0.34$, $SE = 0.03$, $p < .001$), self-control ($B = -0.13$, $SE = 0.02$, $p < .001$) and other-control ($B = -0.04$, $SE = 0.02$, $p < .05$) were unique predictors of anxiety, $R^2 = 0.472$, $F(7, 1019) = 131.85$, $p < .001$; thus these were the only appraisals used in subsequent analyses³.

Appraisals of threat and stressfulness were correlated with one another, with appraisals of self-control, and with both aspects of coping and anxiety (Table 7). Self- and other-control appraisals were also correlated with each other, as well as to both coping strategies and anxiety. Emotion-focused coping was correlated with problem-focused coping and anxiety, whereas the latter two were not related to one another. Finally, intolerance of uncertainty was significantly related to all other variables in the model, with the exception of problem-focused coping (Table 7).

³As vaccination may have influenced appraisals of H1N1, we examined these relations in a MANOVA. Vaccination status predicted appraisals of H1N1, *Pillai's Trace* $F(8, 2042) = 15.39$, $p < .001$, *partial* $\eta^2 = 0.057$. Individuals who had not been vaccinated appraised H1N1 to be less threatening ($M = 1.95$, $SD = 0.70$) and less stressful ($M = 1.91$, $SD = 0.69$) compared to those individuals who had chosen to be vaccinated (M 's = 2.53 and 2.44, SD 's = 0.81 and 0.81, respectively) and those individuals who were undecided about vaccination (M 's = 2.43 and 2.35, SD 's = 0.79 and 0.77, respectively), F 's(2, 1023) = 56.26 and 49.62, p 's < .001, *partial* η^2 's = 0.099 and 0.088. Moreover, those who had chosen not to be vaccinated reported significantly greater levels of self-control ($M = 3.61$, $SD = 0.92$) than those who were vaccinated ($M = 3.39$, $SD = 0.83$) and those who were undecided ($M = 3.43$, $SD = 0.86$), $F(2, 1023) = 6.09$, $p < .01$, *partial* $\eta^2 = 0.012$. Appraisals of other-control did not differ according to vaccination status, $F(2, 1023) = 0.14$, *ns*.

Table 7.

Pearson correlations among intolerance of uncertainty, appraisals, coping and anxiety.

	1.	2.	3.	4.	5.	6.	7.
1. Intolerance of Uncertainty							
<i>Appraisals</i>							
2. Threat	.37**						
3. Stressfulness	.40**	.78**					
4. Self-Control	-.19**	-.16**	-.11**				
5. Other-Control	-.15**	-.01	.01	.54**			
<i>Coping</i>							
6. Emotion-focused	.59**	.40**	.43**	-.10**	-.06*		
7. Problem-focused	.06	.17**	.19**	.25**	.25**	.43**	
8. H1N1 Anxiety	.48**	.59**	.62**	-.32**	-.18**	.45**	.05

* $p < .05$; ** $p < .01$

A Priori Model

In the hypothesized predictive model, all mediating variables were freed to covary except where appraisals were specified to predict coping styles. The model paths were specified such that intolerance of uncertainty predicted all of the appraisals (the first set of mediators), coping strategies (the second set of mediators), and H1N1 anxiety. The four appraisal variables were specified to predict coping strategies as well as H1N1 anxiety, and emotion- and problem-focused coping were specified to predict H1N1 anxiety. All reported beta values are standardized and the tests of significance are two-tailed. To test for indirect effects, bootstrapping techniques for simple mediation (Preacher & Hayes, 2008), as well as sequential mediation (Hayes, Preacher, & Myers, 2010), within the model were utilized. Although the hypothesized measurement model yielded a significant chi square (this is to be expected as Chi Square is sensitive to sample size), fit indices were above .90, and RMSEA was below the desired value of .08, $\chi^2(322) = 1277.03, p < .001$; RMSEA = .055, CI{.05; .06}; NNFI = .97; CFI = .98; Table 8). Thus, the predicted model was a good fit to the data.

Direct effects of predictor on mediators and outcome. As seen in Figure 1, intolerance of uncertainty was directly predictive of all appraisal dimensions, such that greater intolerance of uncertainty was associated with greater threat and stressfulness appraisals, but lower levels of both appraised self- and other-control. Consistent with the correlations, intolerance of uncertainty was related to higher endorsements of emotion-focused (but not problem-focused) coping, and greater anxiety about contracting H1N1.

Table 8.

Comparative fit indices for the confirmatory and structural models.

Model	χ^2	df	<i>p</i>	NNFI	CFI	RMSEA	RMSEA CI
Predictive	1277.03	322	<.001	.97	.98	.055	.05, .06
No mediators	2809.81	342	<.001	.94	.94	.08	.08, .09
Appraisal mediators only	2034.86	334	<.001	.96	.96	.07	.07, .07
Coping mediators only	2211.28	338	<.001	.95	.96	.07	.07, .07
χ^2 (difference) Alternative Model 1	1532.78	20	<.001				
χ^2 (difference) Alternative Model 2	757.83	12	<.001				
χ^2 (difference) Alternative Model 3	934.25	16	<.001				

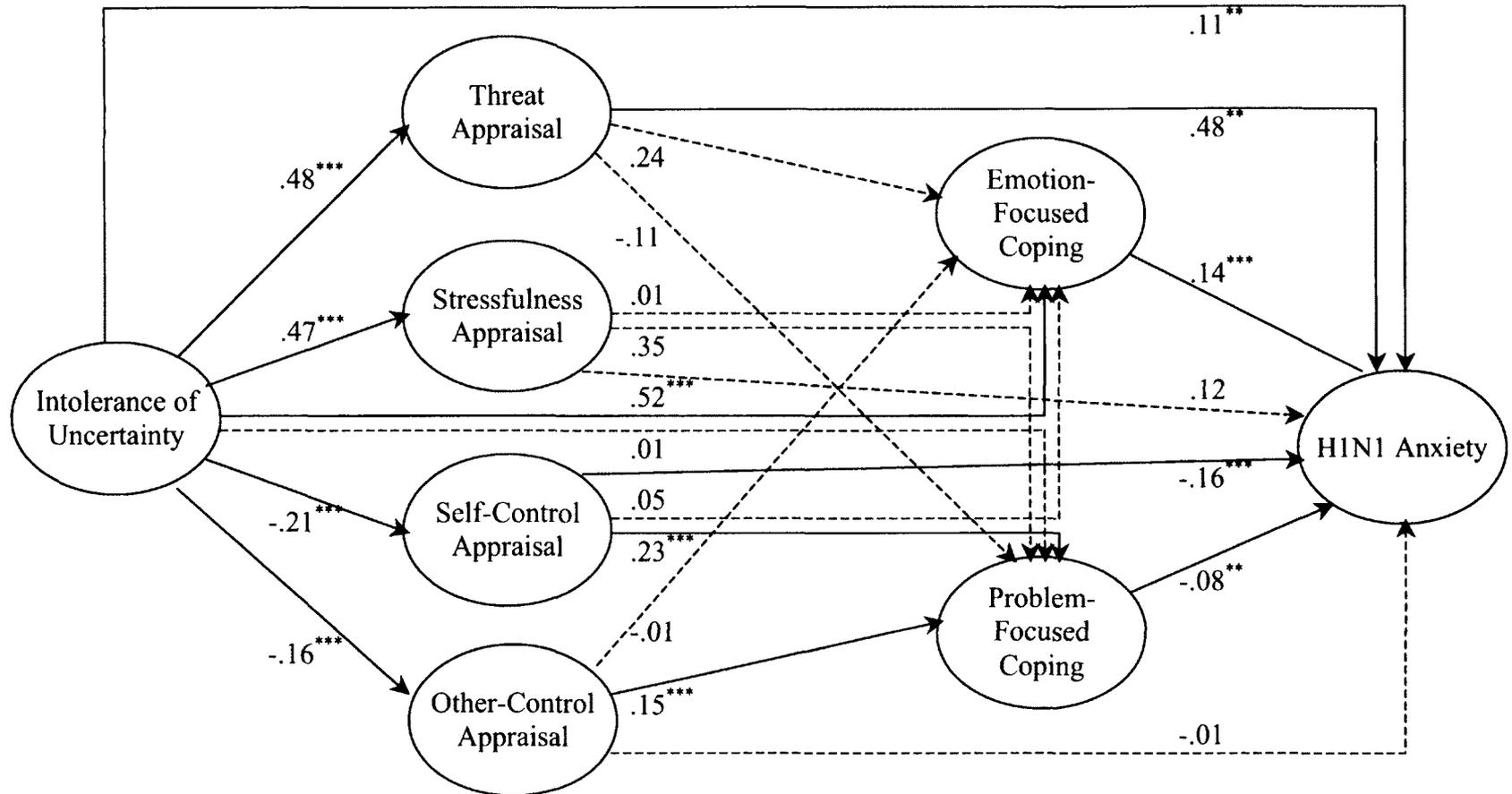


Figure 1. Predictive structural equation model. Standardized beta coefficients are noted in the diagram. Solid lines indicate significant pathways and perforated lines represent non-significant pathways.

** $p < .01$; *** $p < .001$

Appraisal variables, coping strategies and H1N1 anxiety. As seen in Figure 1, H1N1 anxiety was directly predicted by threat and self-control appraisals, and by the endorsement of emotion- and problem-focused coping. In contrast, anxiety was not directly predicted by appraisals of other-control, and stressfulness appraisals were neither directly, nor indirectly related to H1N1 anxiety. Furthermore, neither threat nor stressfulness appraisals reliably predicted either of the coping strategies, whereas appraisals of self- and other-control were predictive of the endorsement of problem-focused coping; but these control appraisals were not related to emotion-focused coping.

Indirect effects of appraisals and coping strategies. Bootstrapping tests for indirect effects (Preacher & Hayes, 2008) were utilized for simple mediation in the model where paths were significant (Hayes et al., 2010). In this regard, the indirect relations between intolerance of uncertainty and H1N1 related anxiety were examined, while controlling for all of the other mediators in the model (Preacher & Hayes, 2008). The confidence interval for the bootstrapped test of indirect effects did not include zero when evaluating the pathways through threat appraisals ($CI\{.003; .012\}$ $SE = .003$), appraisals of self-control ($CI\{.002; .018\}$ $SE = .005$), and emotion-focused coping ($CI\{.027; .078\}$ $SE = .013$), indicating significant indirect effects. Using similar bootstrapping analyses for the sequential pathways, the confidence interval for the bootstrapped test of the sequential effects of self-control and problem-focused coping on the relation between intolerance of uncertainty and reported anxiety did not include zero ($CI\{.009; .040\}$ $SE = .008$), nor did the sequential effects of other-control and problem-focused coping ($CI\{.004; .028\}$ $SE = .006$), indicating a significant total indirect effect in both instances.

Alternative Models

Model 1. All of the pathways in relation to the appraisals and coping strategies as mediators were specified to equal zero, and the model fit was assessed with the independent variable, intolerance of uncertainty, predicting anxiety. This alternative model yielded a significant chi square, fit indices above .90, and a RMSEA at the desired value of .08, $\chi^2(342) = 2809.81, p < .001$; RMSEA = .08; NNFI = .94; CFI = .94. However, the fit statistics were less desirable than our a priori model, and more importantly, a Chi Square difference test indicated that this alternative model yielded a significantly worse fit to the data than the a priori model in which appraisals and coping strategies were included as sequential mediators, $\chi^2_{difference}(20) = 1532.78, p < .001$.

Model 2. The second model tested was one in which only the appraisals were included as mediators in the relationship between intolerance of uncertainty and H1N1 anxiety. This alternative model yielded a significant chi square, fit indices above .90, and a RMSEA below the desired value of .08, $\chi^2(334) = 2034.86, p < .001$; RMSEA = .07; NNFI = .96; CFI = .96. Once again, however, the fit statistics were less desirable than our a priori model, and the Chi Square difference test indicated that this alternative model yielded a significantly worse fit to the data, $\chi^2_{difference}(14) = 757.83, p < .001$.

Model 3. The last alternative model tested included the coping strategies as mediators, but did not include the appraisals. This alternative model also yielded a significant chi square, fit indices above .90, and a RMSEA below the desired value of .08, $\chi^2(338) = 2211.28, p < .001$; RMSEA = .07; NNFI = .95; CFI = .96. Again, the fit statistics were less desirable than our a priori model, and a Chi Square difference test

indicated that this alternative model yielded a significantly poorer fit to the data, $\chi^2_{\text{difference}}(16) = 934.25, p < .001$ (see Table 8 for a summary of all model comparisons).

Discussion

Although there have been reports concerning the behaviours individuals engage in during a pandemic, few studies have examined the psychological toll exacted by uncertainty associated with a new viral threat. It was reported that the threat of viral illnesses (e.g., SARS) were accompanied by elevated levels of anxiety related disorders (Lee et al., 2007; Mak, Chu, Pan, Yiu & Chan, 2009) and that such effects were still apparent 30 months after the viral outbreak (Mak et al., 2009). Although the threat of SARS was fairly significant, there was considerable inter-individual variability in the response to this threat (Sim, Chan, Chong, Chua, & Soon, 2010). The factors that contributed to this variability were not determined, but in a study with a small number of hospital workers it appeared that clinically meaningful psychiatric symptoms were most notable among those with a psychiatric history (Lancee, Maunder & Goldbloom, 2008).

Common to these situations was that there was a considerable degree of ambiguity concerning the pandemic, but the influence of an individuals' intolerance of uncertainty was not assessed in these studies. Nevertheless, it appears likely that this factor is related to stress appraisals and anxiety in other situations. For instance, intolerance of uncertainty contributed to appraisal of threat among women who have survived breast cancer (Wonghongkul, Moore, Musil, Schneider, & Deimling, 2000), as a positive predictor of anxiety among females unsure of their human papillomavirus status (Rosen et al., 2010), and as a positive predictor of depressive symptoms, pain, and fatigue among individuals living with Hepatitis C (Bailey et al., 2009). The present

investigation, performed during the peak of the 2009 H1N1 pandemic, demonstrated that intolerance of uncertainty predicted anxiety, and that stressor appraisals and coping strategies played a mediating role in this regard.

Despite the wide spread media attention to H1N1, and the lateness of vaccine becoming available, perceptions of threat and stressfulness were only moderate, as were levels of anxiety. Moreover, consistent with reports indicating that perceptions of H1N1 risk were mild to moderate (Goodwin et al., 2009; Rubin et al., 2009), participants believed that they maintained control over outcomes regarding the situation, and generally did not believe that H1N1 represented an uncontrollable situation. This said, as reported in the context of other negative life events (Chen & Hong, 2010), greater intolerance of uncertainty was associated with H1N1 related anxiety. Indeed, this was a direct effect being evident even when appraisals and coping strategies were accounted for in the model. In addition to this direct effect, it appeared that both greater appraisals of threat as well as emotion-focused coping independently acted to partially mediate the relation between intolerance of uncertainty and anxiety. These findings are in keeping with reports implicating intolerance of uncertainty as being fundamental in affecting appraisals of potentially threatening situations, and the actions taken in this regard (Peter & Bot, 2009; Rosen et al., 2007).

It has been shown that emotion-focused coping (e.g., self-blame, rumination, emotional containment) has been tied to adverse emotional outcomes (e.g., depression, anxiety), whereas problem-focused coping (e.g., cognitive restructuring, problem solving) appeared not to be tied, or were negatively related, to these mood states (Anisman & Matheson, 2005; Ben-Zur, 2009). These coping strategies followed a

similar pattern in the present study. Emotion-focused coping was related to high levels of H1N1 anxiety, whereas problem-focused coping was negatively related to anxiety. Moreover, intolerance of uncertainty was directly related to higher endorsement of emotion-focused coping, irrespective of appraisals, and these emotion-focused coping strategies, in part, mediated the associated increase of anxiety levels. Thus, in this context, emotion-focused efforts did not appear to be an effective strategy for diminishing distress.

In the present study, much like that ordinarily observed in the absence of a threat, problem-focused coping generally predominated over emotion-focused coping strategies. This contrasts with that of depressed and/or anxious individuals who typically display higher levels of emotion- relative to problem-focused strategies (Matheson & Anisman, 2003). In fact, participants perceived themselves as possessing a great deal of control over H1N1, and might have believed that the situation was one that could be altered. A sequential mediation analysis revealed that individuals who could tolerate uncertainty had higher appraisals of self- and other-control, which in turn, were associated with a greater likelihood of endorsing problem-focused coping, and ultimately lower anxiety in relation to H1N1. In effect, it seems that appraisals of control regarding a potential health threat may be directly related to effective coping strategies, at least in relation to reduced psychological distress. To be sure, these data are correlational and thus causal conclusions cannot be drawn in this regard.

The levels of appraised stress and threat expressed were comparable, and were highly related to one another. Yet, only threat appraisal was a unique mediator in the relation between intolerance of uncertainty and anxiety. It is possible that the items

assessing stressfulness appraisals reflected the availability of coping resources (e.g., to what extent does this situation tax or exceed my coping resources), whereas perceptions of threat primarily addressed the potential for harm (e.g., this event will have a negative outcome for me). Thus, although both constructs were correlated with anxiety, it seems likely that the concern about harm to the self (threat) was the unique predictor of anxiety. Moreover, although both threat and stressfulness appraisals were correlated with emotion-focused coping, such coping efforts did not mediate the relation between threat and feelings of anxiety. This said, it ought to be considered that the threat of H1N1 went far beyond any single individual, in that it could affect their family and friends. Furthermore, perceptions of threat might not have been restricted to the pandemic, but might have also been related to widespread media reports concerning the safety of the vaccine. Indeed, vaccines in North America and Europe were late in arriving, and were surrounded by questions regarding their safety and the possibility that the inoculation could promote Guillain-Barré syndrome (Centre for Disease Control, 2009; Larson & Heymann, 2010; Maltezou et al., 2010; Thoon & Chong, 2010). In fact, in the present sample, less than 31% had been inoculated against H1N1 at the time of testing, and of the Canadian population as a whole, only 41% had been inoculated by April 2010 (Statistics Canada, 2010).

Although the present study has implications concerning the influence of psychological reactions to a health threat and well-being, there are several limitations that ought to be underscored. Specifically, the period during which H1N1 emerged and peaked was tumultuous. Despite being among the most prominent news stories for almost four months, this period was filled with great uncertainty as reports from different

experts often contained contradictory information (Sandman, 2009). Indeed, government agencies and media outlets need to ensure that they have one voice so that the delicate balance between conveying the potential severity of a pandemic and yet preventing panic can be negotiated (Jones & Salathe, 2009). Likewise, over the course of the study, the availability of H1N1 vaccine increased, and greater numbers of individuals were inoculated. As such, anxiety and risk appraisals might have varied over the time period during which the data were collected. In order to minimize the influence of changes associated with this fluid event, data was collected over a relatively narrow window (53 days). Importantly, however, analyses conducted with time indicated that levels of all variables in the model were stable over this period. Finally, it should be underscored that the analyses performed were correlational and hence causal or even directional relations are not justifiable. Although the directional interpretations offered are in keeping with prior research concerning appraisals and coping (Folkman & Lazarus, 1988), it is possible, and even likely, that just as appraisals might influence coping, the adoption of certain coping methods could affect the nature of the appraisals that were made. Finally, the participants were self-selected, possibly contributing to response biases emanating from having a greater concern about H1N1, or being more problem-focused in their approach to contending with it.

The present findings point to the importance of recognizing the relationship between appraisals, coping methods and anxiety among individuals dealing with an ambiguous situation. To a considerable extent, an individual's inability to tolerate uncertainty, as well as their perceptions of threat due to the pandemic, were related to greater anxiety. Furthermore, intolerance of uncertainty was associated with appraisals

of less control over the situation, and thereby a lower likelihood of using problem-focused coping, both of which predicted elevated anxiety. These findings suggest that statements provided by health agencies during a time of threat should not only address the physical actions that the public can endorse to prevent contraction of the disease, but should also work to educate individuals on how to accurately evaluate the information they may be receiving from various sources, and how to contend with the emotions that may arise during the tumultuous event. Ultimately, providing precise and clear information regarding measures that serve to enhance individuals' perceived control over the threat may be appropriate for eliciting coping methods that limit anxiety.

Chapter 4: The Impact of Previous Experience on Perceptions of Future Threats

The H1N1 pandemic appeared to have significant effects on the psychological well-being of some members of the Canadian public. Study 2 revealed that individuals who could not tolerate uncertainty experienced greater levels of anxiety in relation to H1N1, regardless of how they appraised, or coped with the situation. Additionally, those who perceive the pandemic to be threatening, or who utilized emotion-focused coping, also reported elevated levels of anxiety.

In light of the findings that most individuals did not perceive great severity or susceptibility to the H1N1 pandemic in Study 1, yet that there were significant psychological implications of the health threat for some individuals in Study 2, we wished to determine how individuals would react to the occurrence of another viral health threat in the future. As such, in Study 3 we examined whether the familiarity individuals had with a viral disease determined their reaction to a future viral threat. Also, due to the importance of intolerance of uncertainty in Study 2, we examined individuals' appraisals of ambiguous scenarios in Study 3, to investigate whether there may be a trait tendency to view uncertain situations in a negative light.

Study 3: Appraisals of Ambiguous Situations and Future Health Threats

Although the contraction risks of the 2009 H1N1 pandemic have subsided, some virologists have suggested that another pandemic will occur again in the form of avian flu or a viral combination of avian and other flu strains that will increase transmission and/or lethality (Li et al., 2010; Toner, 2010; Webster & Govorkova, 2006). Thus, members of the public may once again have to contend with a health threat that possesses unknown implications.

When confronted with a new risk, individuals often perform comparisons to previous threats in making their appraisals of the new situation and the actions that should be taken to contend with it (Fischhoff, 1995). The ease with which a previous event can be recalled should increase the likelihood of an individual believing it (or a similar event) will occur again (Hevey, 2005). As such, having experienced the H1N1 pandemic, members of the public might be more likely to believe pronouncements of another viral threat, such as that of H5N1. In fact, H5N1 may present a situation more threatening than that of the original H1N1 illness, as individuals are now familiar with the potential of a viral illness to spread and become a pandemic.

Media and Flu Fatigue

In contrast to this supposition, even prior to the emergence of H1N1, representatives from the World Health Organization were concerned about the emergence of 'flu fatigue' wherein the public was so tired of hearing about potential viral threats, they would no longer give credence to warnings by health officials (Bennett & Gale, 2008). Indeed, this might be compounded by the frequent warnings of other hazards, including economic stability, global warming and threats of terrorism, which often have

not materialized or have encountered multiple different (or contrary) opinions regarding the validity of the threats (Havice-Cover & Drennen, 2009; Hawkes et al., 2009). Indeed, the credibility of pandemic warnings may have been questioned, as the previous H1N1 outbreak did not reach the level of severity, or the mortality levels, that had been feared.

Although most individuals receive their information regarding threats to well-being through a media source, there has been a high degree of scepticism and mistrust regarding the information provided by various media outlets. In this regard, it is believed that the media tends to give extensive attention to new and unpredictable health threats, and that it has discredited itself by allotting excessive attention to events that often do not materialize (Elledge, Regens, & Boatright, 2008; Sandman, 2009). Additionally, the influence of contrary news reports stating that the risk of the pandemic was exaggerated may have exerted an influence on public perceptions. In this regard, negative events are frequently more influential than those of positive outcomes (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), and when faced with a new pandemic threat, participants may recall news reports surrounding the vaccine controversy, more than they would the news reports suggesting that efforts to combat H1N1 had succeeded.

Given the backdrop of repeated threats that have most often not materialized, new warnings that carry a familiar theme may result in individuals becoming apathetic towards the threat and reluctant to engage in preventative behaviours. Yet, as some viral threats have occurred, albeit with less impact than feared, there may be individuals who exhibit a very different response, being constantly on edge and fearing a coming catastrophe. Thus, the aim of the present study was to determine the influence of having experienced the H1N1 pandemic on responses to a future viral threat. Furthermore, it

was also a goal of the study to determine if the level of the familiarity with the viral risk would affect appraisals of the illness. To this end, participants were presented with a news article indicating a viral threat was imminent, but the name of the virus was manipulated to comprising either a new mutated strain of H1N1, H5N1 or D3N4. It was hypothesized that appraisals of threat, and reports of anxiety, would vary amongst the individuals who read the newspaper articles describing the different viral threats, but these outcomes could vary depending on individual appraisals of the threat. Specifically, it was expected that because H1N1 had previously been found not to be a major threat, whereas there have been reports of a H5N1 virus that could potentially be severe, those individuals that read an H5N1 related script would be more affected than those who read an H1N1 script. This said, because a previous experience with H1N1 could easily be recalled by participants, seeing this virus reappear in a mutated form may result in appraisals of the H1N1 virus as more threatening, less controllable, and more anxiety provoking than that of a novel viral threat. Indeed, the threat of H1N1 reappearing might be taken to suggest that previous efforts to combat the illness were not successful in the long-term. Finally, the D3N4 virus was entirely fictional, and hence participants would never have encountered this term. Thus, it was expected that a script involving this challenge would be less threatening or anxiety provoking, than that of the other viruses.

It will be recalled that intolerance of uncertainty is closely tied to individual appraisals of threats, particularly those of an ambiguous nature, and thus might contribute to anxiety. As such, in the present investigation it was expected that a relation would be evident between intolerance of uncertainty and anxiety, and that this would be mediated

by appraisals of the viral threat. Moreover, this mediation would vary as a function of the nature of the threat presented in the newspaper articles participants read.

Inasmuch as individuals might differ with respect to how they appraise ambiguous situations, in general, it is possible that those individuals who appraise life events in a negative fashion might also appraise viral threats in the same way. Moreover, it is also possible that even under these conditions, a viral threat will elicit anxiety above and beyond the contribution of general negativity.

Finally, previous experiences with the H1N1 virus might have a considerable influence on subsequent reactions to the threat of this same virus or other viruses like it. In effect, it would be expected that H1N1 contraction status and H1N1 vaccination status would predict anxiety and appraisals of a new viral threat. Those who had contracted, or were unsure if they had contracted H1N1, would report the greatest amount of anxiety, and would appraise a coming novel virus as being relatively stressful and an event that individual's would have little control over. Similarly, those participants who were vaccinated would report the greatest experience of anxiety about a new virus, and would appraise the coming threat as having a particularly great impact as these very individuals, by virtue of having previously been vaccinated, likely were most affected by a viral threat. It was further expected that the virus read about in the news article would moderate the relationship between H1N1 contraction (or vaccination status) and appraisals and anxiety. Specifically, those who had previously contracted the virus might be psychologically sensitized and thus would be most anxious about a potential viral threat that they had heard of for which they had no immunity (e.g., H5N1) as opposed to a novel threat (D3N4).

Method

Participants

Participants comprised 257 women ranging in age from 18 to 64 ($M = 32.52$, $SD = 10.85$), and 59 males ranging in age from 18 to 65 ($M = 34.76$, $SD = 11.18$), living anywhere within Canada. Participants' ethnicity comprised Euro-Caucasian (70.57%, $n = 223$), Asian (23.73%, $n = 75$), Aboriginal (0.95%, $n = 3$), Black (1.27%, $n = 4$), South/Latin American (1.58%, $n = 5$), Arabic (0.63%, $n = 2$) and Other (e.g., mixed ethnicity, 1.27%, $n = 4$). Approximately one third of participants had received a university degree (32.91%, $n = 104$); relatively equal proportions of the participants had received a college diploma or trade certificate (23.42%, $n = 74$), or had completed some college or university (25.63%, $n = 81$); and a smaller percentage had obtained a high school degree or less (18.04%, $n = 57$). A small percentage of participants were retired (2.84%, $n = 9$), whereas most participants were employed full-time (40.82%, $n = 129$) and part-time (22.15%, $n = 70$), yet a large percentage was not employed at all (34.18%, $n = 108$). Income ranged from less than \$30,000 (20.57%, $n = 65$), \$30,000 - \$59,999 (32.91%, $n = 104$), to \$60,000 or more (46.20%, $n = 146$; one participant did not provide information regarding their average family income).

Procedure

Data were collected in the spring following the H1N1 peak, but while vaccination against swine flu was still available. Participants were recruited from online classified websites and invited to complete the study on line. After indicating their informed consent (Appendix H), they were randomly assigned to one of three conditions. In each condition, participants read about, and then provided their response to, either a) a new

mutated strain of H1N1 swine flu; b) H5N1 avian flu, or c) a fictional virus, D3N4, respectively. Participants then viewed a second informed consent, explaining that deception had been used in the study, and that the news article delineating a coming pandemic had been fictional (Appendix I). Knowing the true purpose of the study, participants had the choice to have their data included in the study, or to have all their responses deleted. A debriefing was then provided to participants with contact information for public health agencies, as well as the WHO (Appendix J). Responses were verified for validity as in Study 2.

Measures

H1N1 experience. Participants responded to their previous experience with H1N1 (e.g., whether they contracted the illness, or were vaccinated), as well as their opinion of the severity of the pandemic and how government and health officials dealt with it (Appendix K).

Appraisal of ambiguous situations questionnaire. This questionnaire presented participants with 11 scenarios that could be interpreted with varying degrees of personal implications (e.g., You are applying some sun tan lotion when you notice a small mass on your neck. Your physician performs a small biopsy and says it is probably nothing, but that he cannot be sure until the test results come back in a week; Someone you are very close to (e.g., partner) leaves to drive home and is supposed to call you when they get in. It's been a couple of hours and you have not heard anything. There is no answer at their place). Participants indicated how threatened and distressed they were by these situations, as well as the control they believed they had over the event on a five point scale from one (not at all/no control) to five (extremely/complete control; Appendix L). A

principal components analysis with a varimax rotation was conducted to determine the factors along which this scale could best be organized. Items were included on a factor when loadings were greater than 0.40. This analysis, along with interpretation of a scree plot, suggested a two-factor solution addressing a) appraisals of the stressfulness of the events, which comprised appraisals of threat and distress (Cronbach's $\alpha = 0.89$), and b) appraisal of control (Cronbach's $\alpha = 0.79$).

Intolerance of uncertainty. As explained in Study 2, this scale assessed the levels of uncertainty that an individual is able to tolerate as a personal trait (Cronbach's $\alpha = 0.95$; Buhr & Dugas, 2002; Appendix E).

Fictional news article. Participants read a fictional news article delineating that another virus was guaranteed to appear during the following winter, and that it would have implications much more severe than that of H1N1. In this article, the name of the virus was manipulated over the three conditions to be either a new strain of swine flu (H1N1), avian flu (H5N1), or a fictional virus (D3N4; Appendix M).

Stress appraisal measure. Participants responded to this measure as in Study 2; however, responses were reported in relation to the individuals' appraisal of the viral threat over seven dimensions: threat, centrality, challenge, self-control, other-control, uncontrollable, and stressfulness (Appendix F). Bivariate correlations among the subscales raised concern as some factors were highly correlated with one another, (e.g., threat and centrality $r = 0.83$, $p < .001$, threat and stressfulness $r = 0.82$, $p < .001$). Thus, a principal components analysis was performed with a varimax rotation and revealed that the scale could be organized along two factors. The first factor reflected appraisals of the stressfulness of the virus and was comprised of threat, stressfulness, centrality, challenge

and uncontrollability (Cronbach's $\alpha = 0.93$). The second factor represented control in regard to the virus and comprised self- and other-control (Cronbach's $\alpha = 0.90$).

State anxiety. Participants responded to this measure as in Study 2; however their responses were in relation to the viral condition that they had read about in the news article (Cronbach's $\alpha = 0.96$; Appendix G).

Results

Descriptive Analyses

In general, age was not a significant predictor of the variables in the study, with the exception of a small relationship with anxiety ($B = -0.01, p < 0.05$), $F(1, 314) = 4.44, p < 0.05, R^2 = 0.011$, and intolerance of uncertainty ($B = -0.01, p < 0.05$), $F(1, 314) = 4.71, p < 0.05, R^2 = 0.01$. However, the variance accounted for by age was very small and thus this variable was not included as a covariate in subsequent analyses⁴. None of the variables differed by gender, and this variable was not included as a covariate.

Intolerance of uncertainty was related to perceptions that both ambiguous life events and the viral pandemic would be stressful, and correspondingly, was positively related to greater reports of anxiety (Table 9). Interestingly, the stressfulness of general ambiguous life events was not related to the control individuals had over these events, but was positively related to the appraised stressfulness of a viral event and to the anxiety experienced in this regard. In contrast, a greater perception of control over general ambiguous situations, and control during a viral pandemic, were related to reports of reduced anxiety (Table 9).

⁴ Age was examined as a covariate, but was not a significant predictor in any analyses.

Table 9.

Pearson correlations among intolerance of uncertainty, general ambiguous life event appraisals, viral appraisals, and anxiety.

	1.	2.	3.	4.	5.
1. Intolerance of Uncertainty					
<i>Appraisals of Ambiguous Life Events</i>					
2. Stressfulness	.44**				
3. Control	.01	-.03			
<i>Appraisals of Viral Threat</i>					
4. Stressfulness	.32**	.42**	.00		
5. Control	-.16**	-.14*	.00	-.09	
6. Anxiety	.47**	.33**	-.14*	.51**	-.31**

* $p < .05$; ** $p < .01$

H1N1 Experience

Participants varied in their perception of the H1N1 viral event as a pandemic. Only a small portion of the participants reported that they believed the spread of H1N1 in 2009 was of pandemic proportions (13.29%, $n = 42$). One third of participants responded that H1N1 had not been a pandemic (36.39%, $n = 115$), whereas 50% of the participants ($n = 158$) were uncertain. Regardless of their perception of the event, it is certain that the participants were familiar with the H1N1 event. During the pandemic, vaccination was the most effective protective action individuals could endorse, yet within the current sample most participants had decided against vaccination (55.38%, $n = 175$). A smaller portion had been vaccinated (32.91%, $n = 104$) and a still smaller subset of individuals had been (and still were) undecided about being vaccinated against H1N1 (11.39%, $n = 36$). Furthermore, there was a significant relation between perceptions of H1N1 as a pandemic and vaccination status, $\chi^2(4) = 31.88, p < .001$. Predictably, among those participants who did not believe that H1N1 had been a pandemic, a large majority had chosen not to be vaccinated (74.54%, $n = 82$), whereas a smaller portion had received the inoculation (19.09%, $n = 21$), and few participants were still undecided (6.36%, $n = 7$). In contrast, those who thought H1N1 had been a pandemic, did not necessarily believe they needed to act to protect themselves, as equal proportions had (41.61%, $n = 62$), and had not been vaccinated (44.30%, $n = 66$), whereas some were still undecided (14.09%, $n = 21$).

Few participants reported having contracted H1N1, (7.28%, $n = 23$), or were unsure as to whether or not they had been infected (6.96%, $n = 22$), whereas the majority of participants were certain they had not contracted the H1N1 virus (85.76%, $n = 271$).

Influence of Viral Name Manipulation

Participants were randomly assigned to respond to a news article declaring that either a mutated strain of H1N1 (33.54%, $n = 106$), the H5N1 virus (33.86%, $n = 107$), or the D3N4 virus (32.59%, $n = 103$) were posing a pandemic threat. The composition of these groups did not differ by either age, $F(2, 313) = 0.64$, *ns*, gender, $\chi^2(2) = 5.56$, *ns*, the number of participants who had contracted H1N1, $\chi^2(4) = 1.76$, *ns*, or by the number of participants who had received the H1N1 vaccine, $\chi^2(4) = 4.29$, *ns*.

It was hypothesized that the levels of anxiety reported in relation to a coming viral threat would vary according to whether the virus presented in the news article was a mutated H1N1 strain, H5N1 or the fictional D3N4. In general, levels of anxiety reported among these participants were moderate (Table 10), and an ANOVA revealed that contrary to our hypothesis, the anxiety that individuals reported did not vary as a function of the specific viral threat, $F(2, 313) = 0.10$, *ns*. Similarly, a MANOVA revealed that appraisals of the viruses' stressfulness and appraisals of control over the viruses did not vary as a function of the specific viral threat presented in the news article, *Pillai's Trace* $F(4, 626) = 2.87$, *ns*. Appraisals of the viruses' stressfulness were also moderate, whereas appraisals of control in relation to the virus were somewhat higher (Table 10). Furthermore, an individual's personal chance of contracting the virus, or the perception of other individuals' chance of contracting the disease, did not vary according to the name of the virus presented, *Pillai's Trace* $F(6, 622) = 1.36$, *ns*.

Table 10.

Descriptive statistics (means, standard deviations) of measures with possible ranges indicated in parentheses.

	<i>M</i>	<i>SD</i>
Intolerance of Uncertainty (1-5)	2.74	0.80
<i>Appraisals of Ambiguous Life Events (1-5)</i>		
Stressfulness	3.41	0.65
Control	2.31	0.65
<i>Appraisals of Viral Threat (1-5)</i>		
Stressfulness	2.47	0.70
Control	3.42	0.76
Anxiety (1-4)	1.95	0.72

It is known that individuals tend to minimize their personal chances of experiencing negative life events, including risks for illness. In line with this, within the present study, across all viruses, individuals believed their personal chance of contracting the new illness ($M = 30.44\%$, $SD = 21.37$) were slightly, but significantly lower than that of their close friend ($M = 32.79\%$, $SD = 19.84$), $p < .001$, $F(2, 628) = 130.21$, $p < .001$, *partial* $\eta^2 = 0.293$. Moreover, they also indicated that both themselves and their close friend were far less likely to contract the virus relative to others of the general public ($M = 45.27\%$, $SD = 25.04$), $p < .001$.

We had also hypothesized that appraisals of the virus would mediate the relation of intolerance of uncertainty to anxiety, and that the viral condition read about in the news article would moderate this relationship. In order to accommodate the virus being a categorical variable with three levels, it was dummy coded into two variables. The first variable compared H5N1 to H1N1, and the second compared D3N4 to H1N1. The moderated mediation was run twice, once with each dummy variable acting as the moderator while including the other dummy variable as a covariate. This hypothesis was analyzed utilizing the process method for a moderated mediation with multiple mediators (Hayes, 2012). As in Study 2, appraisals mediated the relation between intolerance of uncertainty and anxiety, *adjusted* $R^2 = 0.408$ (Figure 2). However, neither of the dummy variables moderated the mediated model in any way.

Alternative moderated mediation models were tested and none revealed any effect of the viral conditions as a moderator. However, significant alternative mediated models were observed. The influence of stressfulness and control appraisals of the virus in

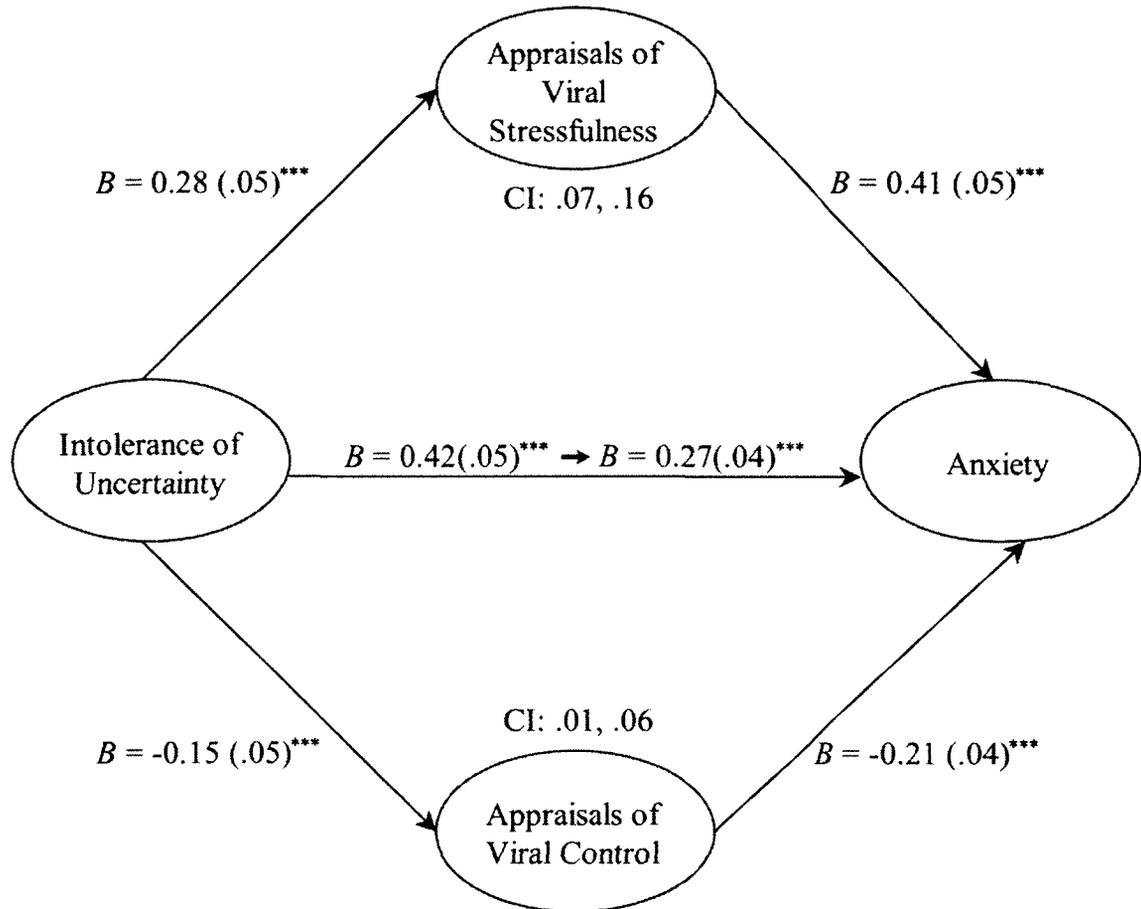


Figure 2. Mediating effects of appraisals of viral stressfulness and control on the relation between intolerance of uncertainty and anxiety.

*** $p < .001$

relation to anxiety were mediated by intolerance of uncertainty, CI's: .05, .15 and -.08, -.01, respectively, *adjusted R*² = 0.408. Similarly, the influence of stressfulness and control appraisals of the virus in relation to intolerance of uncertainty were mediated through anxiety, CI's: .15, .31 and -.17, -.07 respectively, *adjusted R*² = 0.218. Finally, the indirect relation between intolerance of uncertainty and appraisals (through anxiety) was examined for each appraisal individually, while including the other appraisals as a covariate. Anxiety mediated the relation between intolerance of uncertainty and appraisals of the stressfulness of the virus', CI: .13, .24, *adjusted R*² = 0.276, and mediated the relation between intolerance of uncertainty and appraisals of control over the virus, CI: -.17, -.06, *adjusted R*² = 0.110. The relation of anxiety to intolerance of uncertainty was not mediated by appraisals, and likewise the relation of anxiety to appraisals was not mediated by intolerance of uncertainty.

Unique Contribution of Appraisals

It was hypothesized that individuals who generally appraised various ambiguous life situations as being threatening would be more likely to report appraisals of the viral event as stressful and less controllable. As indicated earlier, the stressfulness of ambiguous life events was strongly and positively correlated with the stressfulness of a viral event and negatively correlated with control over the viral event (Table 9). To determine whether appraisals of the virus had a unique influence on reports of anxiety (beyond the effects of general appraisals) a hierarchical regression was conducted which examined the relation of ambiguous life events and viral appraisals in relation to anxiety. Appraisals of the stressfulness ($B = 0.36$, $SE = 0.06$, $p < .001$) and control ($B = -0.14$, $SE = 0.06$, $p < .05$) of ambiguous life events were predictive of anxiety expressed in relation

to the virus, $F(2, 313) = 22.00, p < .001, adjusted R^2 = 0.118$. It also appeared that appraisals of the stressfulness ($B = 0.46, SE = 0.05, p < .001$) and the control ($B = -0.24, SE = 0.04, p < .001$) individuals felt specifically in relation to the virus accounted for additional variance in anxiety above and beyond that associated with general life appraisals, $F_{cha}(2, 311) = 56.47, p < .001, R^2_{cha} = 0.234$.

It might also be that the way in which individuals appraised ambiguous life events influenced how they viewed the viral situation. Thus, a multiple mediation was conducted examining the indirect relationship between appraisals of the stressfulness of ambiguous life events and anxiety (through appraisals of the stressfulness and control of the virus) with 5000 bootstrap iterations and 95% confidence intervals (Preacher & Hayes, 2008). Appraisals related to control over ambiguous life events were not included in this analysis as they were not correlated with any of the proposed mediators. As shown in Figure 3, the direct relationship between appraisals of the stressfulness of ambiguous life situations and the experience of anxiety was mediated by both appraisals of the stressfulness and control individuals perceived in regards to the viral threat, $adjusted R^2 = 0.333$. Analyses of alternative models revealed that appraisals of ambiguous life events stressfulness mediated the relation between the appraised viral stressfulness and anxiety, $CI: .004, .09, adjusted R^2 = 0.333$. In contrast, appraisals of the stressfulness of ambiguous life events did not mediate the relationship between appraisals of control over the virus and anxiety, $CI: -.03, .002$.

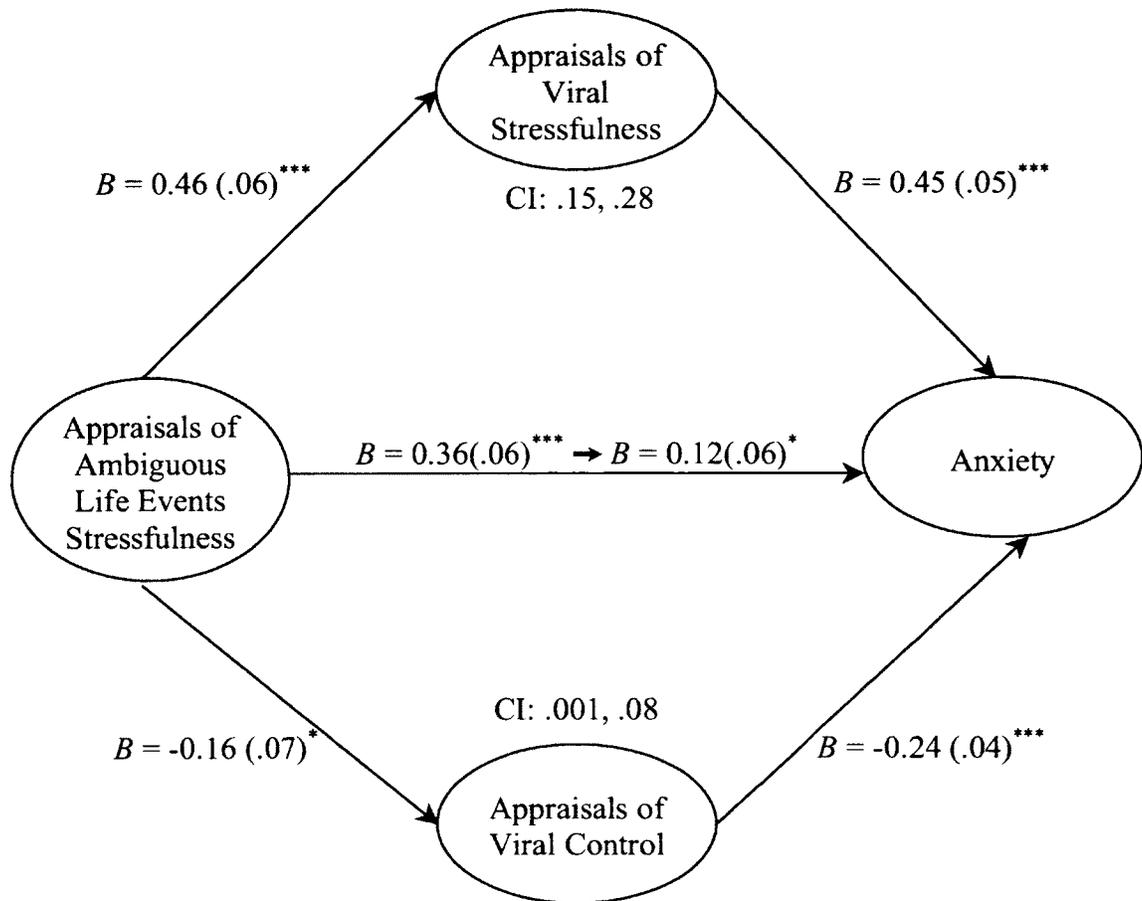


Figure 3. Mediating effects of appraisals of viral stressfulness and control on the relation between appraisals of the stressfulness of ambiguous life events and anxiety.

* $p < .05$; *** $p < .001$

Influence of 2009 H1N1 Pandemic

An additional aim of this study was to determine the influence of living through the H1N1 pandemic on appraisals of future threats. In this regard, we examined participants' perception of H1N1 as a pandemic in relation to their reports of appraisals and anxiety regarding various coming viruses. An ANOVA revealed that perceptions of H1N1 as a pandemic elicited a main effect on anxiety about a coming virus, $F(2, 306) = 7.12, p < .01, \text{partial } \eta^2 = 0.044$. Individuals who believed that H1N1 had been a pandemic reported significantly greater anxiety about a coming viral event ($M = 2.10, SD = 0.74$) compared to those who did not believe that H1N1 had been a pandemic ($M = 1.76, SD = 0.62$), $p < .001$. Those who were unsure about H1N1 as a pandemic did not differ from either group ($M = 1.99, SD = 0.75$). However, this variable did not interact with the virus presented in the news article to predict anxiety, $F(4, 306) = 0.66, ns$. A MANOVA revealed that perceptions of H1N1 as a pandemic had a main effect on appraisals of a coming virus as well, $\text{Pillai's Trace } F(4, 612) = 9.82, p < .001$. Individuals who believed that H1N1 had been a pandemic ($M = 2.67, SD = 0.66$), and those who were unsure ($M = 2.50, SD = 0.68$) appraised the coming virus as being more stressful than those who did not believe H1N1 had been a pandemic ($M = 2.19, SD = 0.67$), $p < .001, F(2, 306) = 18.38, p < .001, \text{partial } \eta^2 = 0.107$. However, beliefs about H1N1 as a pandemic did not predict appraisals of control over the virus, $F(2, 306) = 2.54, ns$. Furthermore, H1N1 pandemic beliefs did not interact with the virus presented in the news article to predict appraisals, $\text{Pillai's Trace } F(8, 612) = 2.53, ns$.

An ANOVA revealed that H1N1 contraction status did not exhibit a main effect on anxiety about a coming virus, $F(2, 307) = 0.65, ns$. Furthermore, H1N1 contraction

status did not interact with the virus presented in the news article to predict anxiety, $F(4, 307) = 0.65, ns$. In contrast, a MANOVA revealed that H1N1 contraction status had a main effect on appraisals of the coming virus, *Pillai's Trace* $F(4, 614) = 2.59, p < .05$. Individuals who had contracted H1N1 appraised the coming virus as being more stressful ($M = 2.89, SD = 0.91$) than those who had not contracted H1N1 ($M = 2.42, SD = 0.67$), $p < .01$. Individuals who were unsure if they had contracted H1N1 ($M = 2.57, SD = 0.74$) did not differ from the other groups in appraisals of the stressfulness felt in relation to the coming virus, $F(2, 307) = 5.08, p < .01, partial \eta^2 = 0.032$. H1N1 contraction did not influence appraisals of control over the virus, $F(2, 307) = 0.05, ns$. Furthermore, H1N1 contraction status did not interact with the virus presented in the article to predict appraisals, *Pillai's Trace* $F(8, 614) = 1.52, ns$.

As engaging in the protective behaviour of vaccination (or the factors that led to them taking this precaution) may have also influenced how participants appraised future viral threats, we examined interactions between vaccination status and the virus the participants were presented with in the news article in relation to anxiety, appraisals of viruses stressfulness, and appraisals of viral control. An ANOVA revealed a main effect of vaccination on anxiety. Individuals who were vaccinated ($M = 2.11, SD = 0.72$), and those who were still undecided about vaccination ($M = 2.20, SD = 0.72$), reported significantly greater amounts of anxiety about a coming pandemic relative to those individuals who were not vaccinated ($M = 1.81, SD = 0.69$), $p's < .01, F(2, 306) = 8.65, p < .001, partial \eta^2 = 0.054$. Similarly, a MANOVA revealed that individuals who were vaccinated ($M = 2.73, SD = 0.68$), and those who were still unsure about vaccination ($M = 2.65, SD = 0.56$), appraised the coming pandemic as being more stressful compared to

those individuals who had not been vaccinated against H1N1 ($M=2.27$, $SD = 0.68$), $p < .01$, $F(2, 306) = 17.91$, $p < .001$, $partial \eta^2 = 0.101$. H1N1 vaccination did not predict appraisals of viral control, $F(2, 306) = 1.88$, ns . Those who were vaccinated and those unsure about vaccination did not differ from one another in relation to both anxiety and appraisals of the virus. The analyses also revealed that vaccination did not interact with the virus presented in the article to predict anxiety about the coming pandemic, $F(4, 306) = 0.39$, ns , or appraisals of the virus, $Pillai's Trace F(8, 612) = 0.73$, ns , respectively.

Discussion

Due to the worldwide impact of the H1N1 virus, most individuals were familiar, at least to some extent, with the risk associated with a pandemic. Given this past experience with the threat of a pandemic, it was the aim of the present study to determine how individuals would appraise a potential future viral threat. It has been proposed that an availability heuristic may exist in regard to risk, such that, the more familiar a previous event, the more likely an individual is to confirm that it will occur again (Hevey, 2005). However, the factors influencing how individuals appraise risks can be complex and multi-faceted (Weinstein, 1999), being affected not only by previous experience, but also by an ability to tolerate uncertainty.

In the present study, it appeared that regardless of familiarity with the virus, individuals were only mildly concerned about any viral threat, as their reported anxiety was uniformly low across conditions. Moreover, appraisals of the threat of a virus did not differ according to whether the proposed illness was familiar (e.g., H1N1) or completely novel (e.g., D3N4). These findings indicate that even after having experienced the H1N1 pandemic, participants did not feel a great amount of concern over

similar health issues. Moreover, even those individuals who had contracted H1N1 did not feel a greater amount of anxiety about a new viral threat, although relative to individuals who had not contracted the virus, they did indicate that the coming virus would have an elevated effect on their general distress (i.e., stressfulness, challenge, threat). It may be that those participants who had contracted H1N1 experienced only mild symptoms with no long-term ramifications, and thus while they acknowledged that it may have an impact on their lives (perhaps by putting them out of commission for a short time) these individuals did not feel any substantial fear of contracting a new illness. Indeed, even while living through the verified 2009 pandemic, not all participants were willing to classify it as such, and even if they did, they did not necessarily feel the need to protect themselves (through vaccination) from the viral illness. As such, the comparisons individuals may be making to previous experience might serve to reassure them that a viral illness does not warrant feelings of anxiety or threat (Fischhoff, 1995). This also supports the notion that individuals may trust their previous personal experiences more than they trust the information provided by the media when evaluating the risks of future health threats (Alaszewski & Horlick-Jones, 2003; Markman, 2009).

Though contracting the illness was unrelated to feelings of anxiety, those who had decided to be vaccinated against H1N1, did express more anxiety than those not inoculated and also appraised a future viral threat to be stressful. Essentially, there may be a subset of individuals who are more concerned about their safety, and thus are more apt to engage in the necessary behaviours to prevent a negative outcome. In spite of this, even when risk was acknowledged, individuals tended to diminish the impact it would have on them personally (Weinstein, 1987). Indeed, participants in the current study

reported the general public's chance of contracting a new virus to be almost as high as 50%, yet minimized their own contraction rates to be much less. As in Study 1, participants believed that their own chances of contracting the new illness were modestly lower than that of a close friend, although this difference was statistically significant, and far less than the chances of contraction among the general public. As well, they also believed that their friends had a significantly lower chance of contracting a viral illness than unknown members of the public. Exhibiting such an optimism bias (or feelings of being less vulnerable than others) has been observed in relation to various other health concerns (e.g., Clarke et al., 2000; Dillard et al., 2009), and which we had observed in the context of a genuine H1N1 pandemic (Taha, Matheson, & Anisman, 2012). It seems that these individuals also extend this optimism bias to close friends, which could potentially influence behaviours toward close others.

Our results are consistent with the fears of the World Health Organization that individuals may be experiencing 'flu fatigue' and no longer heed warnings about viral risks (Bennett & Gale, 2008). This may present considerable difficulties for health agencies in the face of future threats. Having large proportions of the public adhere to protective measures is one of the most effective means of minimizing spread of a viral illness (Public Health Agency of Canada, 2011). A viral threat, theoretically, can spread exponentially once a critical number of cases occur (a tipping point) so that containment becomes unlikely (Markman, 2009). Conversely, a tipping point also exists so that a virus can be contained when a sufficient number of people in the population are vaccinated so that transmission between people is sufficiently reduced (Yang et al., 2009). There are multiple factors that could have resulted in the H1N1 virus not being as

lethal or virulent as initially thought, and vaccination might have been one of these factors. If individuals are no longer fearful of contracting an illness, and hence are not vaccinated against it, the ideal transmission ground for a pandemic could readily be established.

The current findings were in line with those of Study 2, indicating that individuals who cannot tolerate uncertainty are likely to appraise a virus as being more stressful and less controllable, and that this was accompanied by elevated feelings of anxiety. Interestingly, an alternative model suggested that it is also possible that appraisals of the virus were related to intolerance of uncertainty, which then predicted increased levels of anxiety. Regardless of the direction of the relationship, our results are consistent with the notion that the communication of risk information by governments or media needs to walk a fine line. The information transmitted must be able to convince individuals to take precautionary measures, yet, those agencies responsible for issuing public warnings must also acknowledge that members of the public who cannot tolerate uncertainty, may automatically view the ambiguous situation exceptionally negatively and experience psychological distress even before the pandemic presents itself (Sandman, 2009).

It has been reported that those who have a negative cognitive bias are likely to view all situations in a poor light (Alloy et al., 1999), and that appraisals of general life situations predicted the way in which individuals appraised specific events (Hemenover & Dienstbier, 1996). In the current study, those who perceived general life events to be stressful also viewed the viral event to be stressful. Further to this, appraisals of the virus accounted for a unique amount of variance in anxiety, above and beyond appraisals of ambiguous life events. Thus, while the appraisals participants made in regard to the

stressfulness of life events were positively correlated with appraisals of the stressfulness of viral events, the anxiety expressed by individuals in relation to a specific viral threat extended beyond that ordinarily associated with general life threats. In fact, the mediational analysis indicated that appraisals of the stressfulness of ambiguous life events influenced the way in which individuals appraised the stressfulness of the viral event, in relation to anxiety. However, as an alternative model indicated that appraisals of the stressfulness of the virus were predictive of appraisals of general ambiguous events, the direction of the relationship was uncertain.

There are limitations of this study that ought to be acknowledged. Participants read in the news article that a virus will appear in the future, and that precautionary measures should be taken once the virus emerges. It is possible that having just dealt with the H1N1 pandemic, participants could not bring themselves to be concerned with the new threat until it was actually present, as may have been reflected by the low reports of anxiety. Thus, the responses obtained in this study may not necessarily be representative of what individuals would actually feel or do if a virulent illness were to circulate again.

Additionally, the participants represented a self-selected sample. Those individuals who perceived viral threats to be of great concern, or more anxiety provoking, may have chosen not to participate in this study to avoid negative thoughts that may have arisen while contemplating health risks. Alternatively, those individuals who were most concerned/anxious about viral threats might have been especially likely to participate. Regardless of the actual processes governing participation, it ought to be considered that the self-selected sample was not fully representative of all individuals.

Summarizing, individuals were not particularly concerned with the possibility of another pandemic. This may have been because the virus was not yet a reality, or because 'flu fatigue' limited the development of anxiety. This finding suggests that public agencies need to find a novel way to educate the public about viral threats, such that they will be taken seriously, as the previous experiences with viral threats may have dampened the responses of the public (Hevey, 2005). It is possible that due to all the contradictory news reports and confusing information presented during the H1N1 pandemic, media reports no longer have an influence on the public's perceptions of health risks (Cappella & Jamieson, 1997; Elledge, Regens, & Boatright, 2008). Given the absence of effective and trusted individuals or agencies that can transmit this information, the responsibility of effective communication of health threats may eventually have to be transferred to family physicians and other health professionals, who are generally viewed as being trusted (Taha, Matheson, Paquet, Verma, & Anisman, 2011). This more direct and personal avenue of knowledge transmission may be considered more trustworthy than the general media due to an established rapport and concerted efforts to communicate realistically (Alaszewski & Horlick-Jones, 2003). Communication of future viral threats may need to overcome a barrier of apathy with regard to perceived severity, before the public may be willing to engage in the recommended behaviours to protect their safety.

Chapter 5: The Influence of Media and Interpersonal Variables on Perceptions of Chronic and Acute Illness

Study 3 aimed to determine future perceptions of a viral threat having lived through the H1N1 pandemic. The differences between a viral threat that was familiar to the public (i.e., H1N1) and those that had yet to have a significant impact on the population (i.e. H5N1) were assessed. Furthermore, we examined if individuals had a propensity to view ambiguous situations in a particular light, possibly contributing to their reactions to a viral threat.

As Study 3 examined the difference between viruses that were relatively novel threats, it was the aim of Study 4 to delineate the differences between perceptions of health threats which are highly prevalent, publicized and chronic (cancer), and those which are more ambiguous and relatively acute (viral).

Moreover, we sought to examine the role of other interpersonal factors, such as health orientation, when making health-related decisions. As general beliefs regarding well-being may have implications for attitudes towards all illnesses, Study 4 included measures of health beliefs, sources of information, and individuals' prioritization of their health when making lifestyle and well-being decisions.

Study 4: Perceptions of Chronic versus Acute Illnesses

Individuals are ordinarily at risk for numerous diseases, some of which occur at a fairly high frequency. Typically, however, these are not thought about on a regular basis, but nevertheless are a threat. For instance, breast cancer affects one in nine women within Canada (Canadian Cancer Society, 2011a), and prostate cancer affects one in seven men (Canadian Cancer Society, 2011b). Due to the high prevalence rates, as well as the media attention given to fundraising campaigns for cancer, this group of diseases are, to some degree, familiar to most individuals, and the implications of cancer are very well known (Trumbo, McComas, & Kannaovakun, 2007). In contrast, viral illnesses, such as H5N1, are often less well known by the public, and seem to appear out of nowhere when they do become a threat (WHO, 2011). Indeed it is commonly thought, including among virologists, that it is not a question of ‘if’ another viral pandemic will appear, but rather a question of ‘when’. While statistics provide a relatively certain guarantee that a percentage of the population will develop cancer, the chances of contracting H5N1 are much more uncertain. However, if a viral pandemic were to occur again, it would possess the potential to have fatality rates much greater than that of cancer (WHO, 2011). Thus, understandably, for an individual who cannot tolerate uncertainty, the increased presence of various health threats, which receive great media attention and over which little control is possible, may result in great levels of unease.

Health Assessment

Health educators have emphasized the importance of living a healthy lifestyle to decrease one’s chances of developing cancers (Canadian Cancer Society, 2011c). To assess an individual’s overall attitude towards living a healthy lifestyle, four factors have

previously been examined: a) health consciousness refers to the degree to which health behaviours and choices are integrated into one's everyday life, and the tendency to have a positive attitude towards preventative health behaviours; b) health information orientation reflects the degree to which an individual wishes to gain knowledge and seeks out information related to health topics; c) health beliefs represent thoughts about the efficacy and importance of various health behaviours; and d) healthy activities is a measure of how engaged an individual is in behaviours that promote well-being (Dutta-Bergman, 2004).

With advances in technology, many people turn to various media sources in order to obtain information about all aspects of life, including health. However, the divergent motivations of health agencies and entertainment venues to provide this information ought to be addressed. While government agencies might attempt to provide health education to the public, media outlets recognize that in order to maintain reader- and viewer-ship, new information must be provided, often involving the sensationalization of health threats, and the vast attention given to extreme cases, even if these are atypical (Atkin & Arkin, 1990).

Moreover, providing consumers with information may not be enough to elicit action. In this regard, it has been reported that only those individuals who were highly motivated to protect their health, and were particularly likely to seek out health-related information, would engage in more preventative health behaviours (Moorman & Matulich, 1993). These individuals with a greater health-orientation were more likely to seek their health information from newspaper and magazines (Dutta-Bergman, 2004). As these forms of print media require effort and focus to consume, an active participant is

more likely to seek these sources as the information obtained is also sufficiently reputable, detailed, and often provide links to further learn about the topic. In contrast, television reports are often brief and 'entertaining' and therefore are most often reported as sources of health information from passive observers with a low health-orientation (Dutta-Bergman, 2004). Over the past decade increasingly greater use has been made of the Internet to obtain health-related information (Hesse et al., 2005; McMullen, 2006). The use of the Internet represents a unique situation in that health consumers can actively obtain considerable information on any general or specific health topic with little in the way of limitations concerning the amount of information they can receive (Dutta-Bergman, 2004). Yet, there is some risk involved as the validity of this information can be questionable, particularly when it is not informed by controlled research (Weber et al., 2009).

The present study examined how several inter- and intrapersonal variables influence individuals' engagement in prophylactic, or beneficial detection behaviours. In this regard, these behaviours might be related to the characteristics of the illnesses that are being considered. No doubt, there are numerous factors that contribute to illness perceptions, and their influence could potentially vary with attributes of the illness, including its transmissibility (e.g., viral challenges), its chronicity, frequency of occurrence and predictability, whether the illness could be treated and how readily this could be done. This said, there are certain characteristics that might be relevant to stress reactions related to all, or most, illnesses (e.g., the severity or pain associated with the disease), which could influence whether or not individuals adopt appropriate health-oriented behaviours. Thus, it would be useful to determine to what extent health

orientation contributes to perceptions of illnesses and to individuals' engagement in health-oriented behaviours to reduce risk of viral infection, or to promote early detection of a cancer.

Viral Inoculation and Cancer Screening

Public health agencies strongly encourage administration of the flu vaccine to all members of the public over six months of age (Ontario Ministry of Health and Long-term Care, 2011). Flu shots prime the body's natural immunity to fight the viruses that they subsequently come into contact with (Wolfe, 2011). While vaccination is said to prevent the harmful effects of a virus from being experienced by an inoculated individual, screening for illness, such as cancer, is an option individuals can take to determine whether or not they have already developed a disease. In effect, these two situations are utilized for different purposes. Receiving a vaccination to prevent contraction of a virus affects the likelihood of developing a disease and indeed, is conceptually different from cancer screening, which can only potentially influence the severity of an illness that has already developed. However, these actions are similar in that they reduce an individual's chance of encountering serious outcomes (i.e., fatality).

Screening for breast and prostate cancer has been increasingly promoted by health agencies in an effort to detect the disease at earlier stages thereby increasing treatment options, and the chances of treatment success (Esserman, Shieh, & Thompson, 2009). Early detection efforts for breast cancer may include self or physician performed breast exams, and/or mammography; and for prostate cancer include physician performed prostate exams or a prostate-specific antigen blood test (PSA) (Smith, Cokkinides, & Brawley, 2009).

While vaccination and cancer screening may have different purposes, an individuals' decision making process not to engage in these behaviours might involve at least some similar factors. Mistrust in the procedure or medical professionals who recommend them, an optimism bias, or a lack of knowledge about risk, are all cited as reasons not to undergo cancer screening (Ackerson & Preston, 2009) and will be recalled as some of the reasons reported for not receiving the H1N1 vaccination in Study 1. As in the case of the H1N1 vaccination, there has also been controversy over the safety and effectiveness of cancer screening procedures. Both mammography and the prostate specific antigen test have been criticized for a) not providing improvement in mortality rates among those who develop breast or prostate cancer, compared to those who received usual health care (Andriole et al., 2009; Gtozsche & Olsen, 2000; Lin, Crowell, Koenig, Lam, & Maltz, 2011; Miller, To, Baines, & Wall, 2002); and for b) the frequent incidence of false positive results that have promoted feelings of worry, fear and anxiety among those incorrectly identified (Brewer, Salz, & Lillie, 2007; Harvey, Basuita, Endersby, Curtis, Iacovidou, & Walker, 2009; Hubbard, Kerlikowske, Flowers, Yankaskas, Zhu, & Miglioretti, 2011; Lin, Lipsitz, Miller, & Janakiaraman, 2008).

Given both the similarities and differences between cancer and viral illness, it was the aim of the present study to determine the factors related to perceptions of these differing illnesses among the Canadian public. It was hypothesized that active health information seekers would show differences in health-beliefs and health-actions compared to those who passively obtain medical information. Specifically, individuals who receive their health information actively from newspapers, magazines, or the

Internet would exhibit greater health orientation and engage in more health activities, than those individuals who obtained their health information passively from television.

It was also hypothesized that illness perceptions, including the timeline (chronicity of disease or recovery time), consequences, illness coherence (comprehension of illness), and emotional representations (emotions experienced in relation to the illness), would be more severe in response to perceptions of cancer compared to perceptions of H5N1. However, perceptions of control (personal or treatment) and causal factors might have been greater in relation to H5N1, as factual information regarding the spread and prevention of viral illness were more readily available.

Moreover, it was predicted that individuals who reported greater health consciousness would be more likely to endorse receiving vaccination or participating in screening procedures and that this relationship would be moderated by healthy activities, such that those who reported actually engaging in healthy behaviours (as opposed to those who simply identify which behaviours are considered healthy), would have greater intentions to endorse vaccination or screening. Lastly, individuals who believed they had great chances of developing an illness would be more likely to endorse vaccination or cancer screening compared to individuals who perceived themselves to be unlikely to develop an illness. Furthermore, an intolerance of uncertainty would exacerbate this relationship.

Method

Participants

Individuals over the age of 18, living within Canada, and who had not been diagnosed with cancer ($N = 239$) participated in this study. Female participants (84.94%,

$n = 203$) ranged in age from 18 to 71 years ($M = 32.56$, $SD = 10.91$) and male participants (15.06%, $n = 36$) ranged in age from 19 to 77 years ($M = 38.33$, $SD = 14.54$). Participants' ethnicity comprised Euro-Caucasian (66.11%, $n = 158$), Asian (23.43%, $n = 56$), Aboriginal (2.93%, $n = 7$), Black (1.67%, $n = 4$), South/Latin American (1.67%, $n = 4$), Arabic (1.26%, $n = 3$) and Other (e.g., mixed ethnicity, 2.93%, $n = 7$). As in other studies, a large proportion of participants had obtained a university degree (45.61%, $n = 109$), whereas relatively equal proportions had a trade certificate/college diploma (17.57%, $n = 42$), had completed some college/university (19.25%, $n = 46$), or had completed high school or less (17.57%, $n = 42$). A majority of participants were employed full-time (41.42%, $n = 99$) or part-time (25.94%, $n = 62$), whereas the remaining participants indicated that they were retired (2.51%, $n = 6$) or that they were not employed (30.13%, $n = 72$). Income ranged from less than \$30,000 (20.17%, $n = 48$), \$30,000 to 59,999 (33.61%, $n = 80$), to \$60,000 or more (46.03%, $n = 110$; one participant did not provide their family income).

Procedure

Participants were recruited from on-line classified websites. Upon indicating their informed consent (Appendix N), men and women were randomly assigned to either the cancer screening or the viral vaccination condition, such that there was an equal gender composition in both groups. Upon completion of the measures, participants were provided with a debriefing form indicating contact information for either public health agencies within Canada, or for the Canadian Cancer Society, relative to the condition in which the individual had participated (Appendix O).

Measures

Demographics and H1N1 history. Participants responded to general demographic and medial history questions, as well as their opinions on the experience of the 2009 H1N1 pandemic, such as whether or not they were vaccinated against H1N1 and their reasons for this decision, as well as satisfaction with the media and government officials handling of the pandemic (Appendix P)

Intolerance of uncertainty. As in Studies 2 and 3, this scale assessed trait levels of the ability to tolerate uncertainty (Cronbach's $\alpha = 0.95$; Appendix E).

Health questionnaire. This 35-item questionnaire addressed the frequency with which participants gather health information from various sources (e.g., television, newspaper) on a five point scale from zero (never) to four (almost always; Dutta-Bergman, 2004; Appendix Q). Furthermore, this questionnaire also addressed how much participants agreed with statements regarding their health consciousness (e.g., my health depends on how well I take care of myself; Cronbach's $\alpha = 0.84$), health information orientation (e.g., before making a decision about my health, I find out everything I can about this issue; Cronbach's $\alpha = 0.89$), and the healthy activities they were actually engaging in (e.g., eating lots of fruits, vegetables, and grains; Cronbach's $\alpha = 0.70$). These subscales were measured on a five point scale from one (strongly disagree) to four (strongly agree). Subscale totals were calculated by taking the mean across the relevant items.

Condition specific context. Participants were provided with a brief summary of either the incidence of breast and prostate cancer, or the notion that H5N1 could lead to

another pandemic, dependant on the condition to which they were assigned (Appendix R).

Illness perception questionnaire-revised. This version of the questionnaire had been revised for use among a healthy population to assess participants' beliefs about the chronic (Cronbach's $\alpha = 0.89$), or cyclical timelines of an illness (Cronbach's $\alpha = 0.81$), consequences (Cronbach's $\alpha = 0.77$), personal control (Cronbach's $\alpha = 0.76$), treatment control (Cronbach's $\alpha = 0.76$), illness coherence (Cronbach's $\alpha = 0.92$), emotional impact of an illness (Cronbach's $\alpha = 0.94$), psychological causes (Cronbach's $\alpha = 0.93$) or general risk factors for developing an illness (Cronbach's $\alpha = 0.83$). One item addressed whether illnesses were contracted by chance. Participants responded on a five point scale from one (strongly disagree) to five (strongly agree) and means were calculated as total scores for each subscale (Figueiras & Alves, 2007; Appendix S).

Illness behaviour. Participants responded to questions regarding the threat, worry and control they felt in regards to the illness of their condition (Appendix T). Participants also indicated the anticipated chances of contraction for themselves and others, the anticipated severity of the disease, as well as if any actions would be taken to prevent contraction of the illness, or to promote early detection.

State anxiety. As in Studies 2 and 3, participants reported the level of anxiety they felt in regard to the cancer or viral condition they were assigned to (Cronbach's $\alpha = 0.97$; Appendix G).

Results

Descriptive Analyses

Of the variables examined, age was only a significant predictor of information orientation (likelihood of seeking health-related information), $B = .008$, $p < .05$, $R^2 = 0.013$. However, as in previous studies, age accounted for a small percentage of the variance regarding information orientation, and as such it was not included as a covariate. Similarly, gender was unrelated to any of the variables, and thus was not considered as a covariate.

As in the previous studies, a majority of participants had chosen not to receive the H1N1 vaccination (65.69%, $n = 157$), whereas the remaining participants had been inoculated. The majority of participants reported that they had not contracted the H1N1 virus (93.72%, $n = 224$), whereas very small proportions indicated that either they had been diagnosed by a medical professional as having contracted H1N1 (1.26%, $n = 3$), they believed that they had contracted H1N1 but were never officially diagnosed (3.77%, $n = 9$), or they were unsure if they had contracted the illness (1.26%, $n = 3$). Those who had contracted H1N1, or were unsure if they had contracted the virus, were not included in further analyses, just as those who had previously had cancer were excluded.

Most participants also indicated that they did not know anyone who had contracted H1N1 (73.64%, $n = 176$). Relatively small proportions indicated that they knew someone diagnosed with H1N1 by a physician (11.72% $n = 28$), or that they knew someone who had H1N1 but was not officially diagnosed (7.95%, $n = 19$). The individual who was reported to have contracted H1N1 was most often a friend or a co-worker, and was very rarely reported to be a close family member. Finally, a small

proportion of participants were unsure if someone they had known had contracted H1N1 (5.86%, $n = 14$), and two individuals did not respond to this question. In contrast to reports related to H1N1, a majority of participants had a family member that had been diagnosed with cancer (58.58%, $n = 140$), whereas the remaining participants had not. The individuals diagnosed with cancer ranged from being an immediate relative, such as a parent or sibling, to a more distant family member, such as a cousin or niece.

Participants were randomly assigned to respond to questions concerning either their perceptions of H5N1 (47.32%, $n = 106$), or breast/prostate cancer (52.68%, $n = 118$). The composition of these groups did not differ by age, $F(1, 222) = 1.09$, *ns*, gender, $\chi^2(1) = 1.18$, *ns*, H1N1 vaccination status, $\chi^2(1) = .98$, *ns*, H1N1 contraction status of a family member, $\chi^2(3) = 3.46$, *ns*, or by cancer diagnosis among a family member, $\chi^2(1) = 0.67$, *ns*.

Relations between the variables in the present study were dependent on the illness to which participants were responding. For example, in the cancer condition, an intolerance of uncertainty was negatively related to health consciousness and positively related to consequences, the emotional impact and anxiety felt in relation to cancer, as well as believing that psychological factors or chance cause the illness (Table 11); whereas in regard to H5N1, a greater intolerance of uncertainty was also related to greater emotional impact and anxiety felt in relation to the virus, as well as greater reports that general risk factors or chance cause the illness (Table 11). Individuals who reported a great sense of personal control over developing cancer and who had a good understanding of the illness were less likely to have an intention to act by participating in cancer screening; whereas participants who sought information about health matters,

Table 11.

Pearson correlations among intolerance of uncertainty, health assessment, illness perceptions, intentions to act in the future and anxiety.

Responses in relation to H5N1 are presented below the diagonal, and in relation to cancer are presented above. * $p < .05$, ** $p < .01$, *** $p < .001$

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Intolerance of Uncertainty	-	-.18*	-.01	-.09	.10	.16	.18*	-.10	-.10	-.09	.38***	.19*	.12	.23*	-.06	.54***
<i>Health Assessment</i>																
2. Consciousness	.01	-	.51***	.49***	.06	-.08	.18*	.26**	.01	-.01	.12	.09	.05	-.11	.15	-.08
3. Info. Orientation	-.03	.66***	-	.46***	-.05	.01	.21*	.23**	.03	.04	.13	.09	.20*	-.03	.12	.01
4. Activities	-.04	.62***	.52***	-	.12	-.04	.16	.16	.14	-.03	.23**	.02	.17	-.07	.15	.01
<i>Illness Perceptions</i>																
5. Chronic	-.08	.10	.22*	.04	-	.30**	.46***	-.07	-.15	-.18	.34***	-.10	.06	.16	.05	.26**
6. Cyclical	.17	.09	.08	-.08	.29**	-	.32***	-.12	.07	-.35***	.20*	-.07	.07	.28**	.02	.17
7. Consequences	.11	.15	.18	.07	.35***	.50***	-	-.05	-.18	-.16	.19*	.01	.17	.03	.06	.16
8. Personal Control	.11	.17	.18	.01	.11	.13	.23*	-	.29**	.13	-.08	.27**	.18*	-.10	-.19*	-.17
9. Treatment Control	.09	.27**	.20*	.14	.03	.17	.18	.28**	-	-.02	-.21*	.19*	.03	-.13	.15	-.14
10. Coherence	-.12	.10	.19*	.10	-.07	-.37***	-.20*	-.10	-.01	-	-.40***	.01	.05	-.17	-.23*	-.21*
11. Emotional Impact	.29**	.26**	.36**	.16	.34***	.14	.22*	.14	.02	-.04	-	-.01	.03	.41***	.17	.56***
<i>Causes of Illness</i>																
12. Psychological	.17	.15	.17	.13	.24*	.14	.17	.17	.08	-.18	.33***	-	.38***	-.08	.03	.14
13. Risk Factors	.19*	.09	.14	.12	.13	.18	.12	.26**	.14	-.19*	.21*	.59***	-	.01	.04	.16
14. Chance	.26**	-.23*	-.19*	-.28**	-.04	.04	-.05	.20*	.04	-.22*	.09	.13	.17	-	-.12	.31***
15. Intention to act	-.03	.15	.23*	.18	.16	.12	.21*	.11	.21*	.12	.13	.02	.15	-.04	-	.22*
16. Anxiety	.58***	.01	.05	.03	.18	.18	.18	.02	.12	-.04	.52***	.33***	.31**	.21*	.10	-

believed that H5N1 had consequences for their health and who believed that treatment could control the virus were more likely to act by endorsing vaccination (Table 11). Finally, anxiety was positively related to perceptions of cancer as a chronic illness with a great emotional impact, intentions to act and beliefs that the illness was caused by chance. In relation to H5N1 however, anxiety was positively related to believing the virus had an emotional impact and believing the illness was caused by psychological and general risk factors, as well as chance (Table 11).

There were two main types of analyses performed in this Study. The first was descriptive in nature and examined the relations between individuals' health orientation and their sources of health information. The second focus was analytical and examined perceptions of H5N1 or cancer, and the behaviours individuals were willing to engage in to detect or prevent the illness, and identification of some of the factors that governed this relationship.

Health Orientation

Overall, individuals reported being very health conscious ($M = 4.04$, $SD = 0.68$), sought information regarding their health ($M = 3.91$, $SD = 0.74$), and frequently engaged in healthy activities ($M = 3.90$, $SD = 0.63$). Individuals reported learning about disease, and how to prevent it, from particular sources of health information more often than other sources, $F(4, 888) = 84.49$, $p < .001$, $partial \eta^2 = 0.276$. Specifically, participants most often received health information from the Internet ($M = 3.05$, $SD = 1.02$), and turned to this source significantly more often than television, radio, newspapers/magazines, or family and friends, p 's $< .001$. Individuals were next most likely to retrieve information regarding illnesses from either the television ($M = 2.48$, $SD = 1.23$),

newspapers/magazines ($M = 2.39$, $SD = 1.19$), or family and friends ($M = 2.42$, $SD = 1.04$); all of which were sources they used more frequently than the radio ($M = 1.40$, $SD = 1.20$), p 's $< .001$.

It was hypothesized that those who actively sought health information (i.e., from the Internet or newspapers) would be most likely to possess health-oriented beliefs. As we wished to examine multiple indices of health orientation as outcome variables, a Bonferroni correction was applied to establish a more stringent significance level for these analyses. Indeed, a greater health information orientation was related to individuals retrieving their information from newspapers ($B = 0.16$, $SE = 0.04$, $p < .001$), the Internet ($B = 0.15$, $SE = 0.05$, $p < .01$), or family and friends ($B = 0.13$, $SE = 0.05$, $p < .01$), $F(5, 217) = 13.02$, $p < .001$, *adjusted R*² = 0.213. The source of information also significantly predicted health consciousness, $F(5, 217) = 4.90$, $p < .001$, *adjusted R*² = 0.081, wherein health consciousness was positively correlated with seeking information from family and/or friends, ($B = 0.11$, $SE = 0.05$, $p < .05$). Finally, individuals who gathered their health information from newspapers ($B = 0.15$, $SE = 0.04$, $p < .001$) or family and/or friends ($B = 0.09$, $SE = 0.04$, $p < .05$), were more likely to endorse participating in health activities on a regular basis, $F(5, 217) = 5.41$, $p < .001$, *adjusted R*² = 0.090.

Perceptions of Illness

A main thrust of this study was to determine whether individuals perceived a viral threat differently from that of cancer. While controlling for a family experience of either illness⁵, differences were apparent regarding the perceptions of breast/prostate cancer

⁵ Contraction of H1N1 or cancer by a family member or close friend was controlled for in all further analyses.

versus H5N1, *Pillai's Trace* $F(10, 209) = 34.03, p < .001$. Compared to H5N1, individuals perceived cancer to have a more chronic or cyclical timeline, $F's(1, 218) = 219.08$ and $50.35, p's < .001, partial \eta^2's = 0.501$ and 0.188 respectively, to have greater consequences for the individual, $F(1, 218) = 94.51, p < .001, partial \eta^2 = 0.302$, and to have a greater emotional impact, $F(1, 218) = 104.08, p < .001, partial \eta^2 = 0.323$ (Table 12). Moreover, participants believed that treatment could control H5N1 more readily than it could control cancer, $F(1, 218) = 5.26, p < .05, partial \eta^2 = 0.024$ (Table 12). Essentially, cancer was viewed as being more serious and less controllable than was H5N1. However, personal control, as well as an understanding of the illnesses, did not differ based on the disease presented, $F's(1, 218) = .10$ and 2.58 respectively, *ns*. Participants reported the cause of cancer to be attributed to psychological factors (e.g., stress, overwork, worry), $F(1, 218) = 17.14, p < .001, partial \eta^2 = 0.073$, general risk factors (e.g., overweight, genetics), $F(1, 218) = 63.60, p < .001, partial \eta^2 = 0.226$, and chance, $F(1, 218) = 10.57, p < .01, partial \eta^2 = 0.046$, to a greater extent that they viewed these factors to be causes of contracting H5N1 (Table 12).

Participants also believed that they personally had a greater chance of developing cancer, than they had of contracting H5N1 (Table 12), $F(1, 218) = 45.10, p < .001, partial \eta^2 = 0.171$. Irrespective of the illness, participants once again held an optimism bias wherein they reported a lower chance of contracting either disease than would a close friend, and that both of them were less likely to contract either illness compared to a member of the general public, $F(2, 436) = 63.40, p < .001, partial \eta^2 = 0.225$ (Table 13).

Table 12.

Perceptions and causes of illness as a function of the disease presented with possible ranges indicated in parentheses.

	Viral condition		Cancer condition	
	M	SD	M	SD
<i>Illness perception (1-5)</i>				
Chronic timeline	2.36	0.67	3.85	0.81 ^{***}
Cyclical timeline	3.19	0.81	3.97	0.81 ^{***}
Consequences	3.51	0.86	4.48	0.61 ^{***}
Personal control	3.51	0.81	3.48	0.95
Treatment control	3.31	0.73	3.07	0.85 [*]
Coherence	2.64	1.08	2.90	1.25
Emotional representation	2.03	1.01	3.48	1.08 ^{***}
<i>Illness causes (1-5)</i>				
Psychological	2.16	0.98	2.76	1.13 ^{***}
General risk factors	2.75	0.92	3.64	0.75 ^{***}
Chance	2.50	1.39	3.09	1.35 ^{**}

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

Table 13.

Perceptions of illness contraction among one's self, a close friend, and a member of the general public.

<i>Perceived Chances of Contraction (0-100%)</i>	Viral Condition		Cancer Condition	
	M	SD	M	SD
Self	32.00	19.58	45.39	18.08 [†]
Close friend	33.71	19.23 [*]	50.09	18.37 ^{**†}
General public	54.10	25.26 ^{**}	70.94	27.16 ^{**†}

^{*} $p < .001$ relative to self contraction; ^{**} $p < .001$ relative to close friend contraction;

[†] $p < 0.001$ relative to viral condition

A hierarchical regression analysis examining perceptions of the illnesses' revealed that individuals felt greater amounts of anxiety about developing cancer in the future compared to the anxiety they felt about contracting H5N1 ($B = 0.62$, $SE = 0.10$, $p < .001$), $F_{cha}(1, 218) = 36.30$, $p < .001$, $adjusted R^2 = 0.147$. This analysis also revealed that regardless of the illness, those who perceived great amounts of personal control over illness reported less anxiety ($B = -0.14$, $SE = 0.05$, $p < .01$), whereas greater anxiety was reported if they perceived the illnesses would result in negative emotions ($B = 0.41$, $SE = 0.06$, $p < .01$), believed that general risk factors caused the illnesses ($B = 0.12$, $SE = 0.06$, $p < .05$), or simply believed that illness contraction occurred by chance ($B = 0.11$, $SE = 0.05$, $p < .05$), $F_{cha}(10, 208) = 10.71$, $p < .001$, $R^2_{cha} = 0.286$. However, none of these illness perceptions interacted with the participants illness condition in predicting anxiety, $F_{cha}(10, 298) = 0.45$, *ns*.

Response to Illness

It was of interest to determine the actions individuals would be willing to endorse to prevent contraction of H5N1, or to detect cancer. A hierarchical regression examined the relation of health consciousness to future intentions to prevent H5N1/detect cancer, and the illness presented in the participants' conditions was included as a moderator. As health consciousness may represent intentions only, healthy activities were also included as a moderator as an actual measure of behaviour. Only the illness condition predicted individuals' reports of future intentions, $B = 3.92$, $SE = .044$, $F(1, 222) = 78.64$, $p < .001$, $adjusted R^2 = 0.258$. Participants were significantly more likely to endorse being screened for the presence of cancer ($M = 77.12\%$, $SD = 29.64$), than they were to endorse vaccination to prevent the contraction of H5N1 ($M = 37.92\%$, $SD = 36.43$).

As intolerance of uncertainty, and the threat presented by the illness may also play a role in determining future intentions towards vaccination/screening, a hierarchical regression was conducted examining the relation of illness type to future intentions, and the moderating role of self contraction chances and intolerance of uncertainty. Once again, individuals in the cancer condition were more likely to endorse screening than individuals in the H5N1 condition were to endorse vaccination ($B = 3.22, SE = 0.44, p < .001$), and additionally, as individuals self-reported chances of developing one of the illnesses increased, they were also more likely to endorse vaccination/screening ($B = 1.87, SE = 0.31, p < .001$), $F_{cha}(3, 216) = 37.61, p < .001$, $adjusted R^2 = 0.341$. However, intolerance of uncertainty was not a significant predictor of future intentions ($B = -.42, SE = 0.32, ns$). The illness presented in the health condition and the participants' professed chances of contracting the illness also interacted in predicting their future intentions to act, $F_{cha}(3, 213) = 3.83, p < .05$, $adjusted R^2 = 0.033$, such that in the cancer condition most participants endorsed screening regardless of their beliefs about developing the illness. However, only those participants who believed they had slightly elevated chances of contracting H5N1 indicated a modest intention to be vaccinated against the virus (Figure 4).

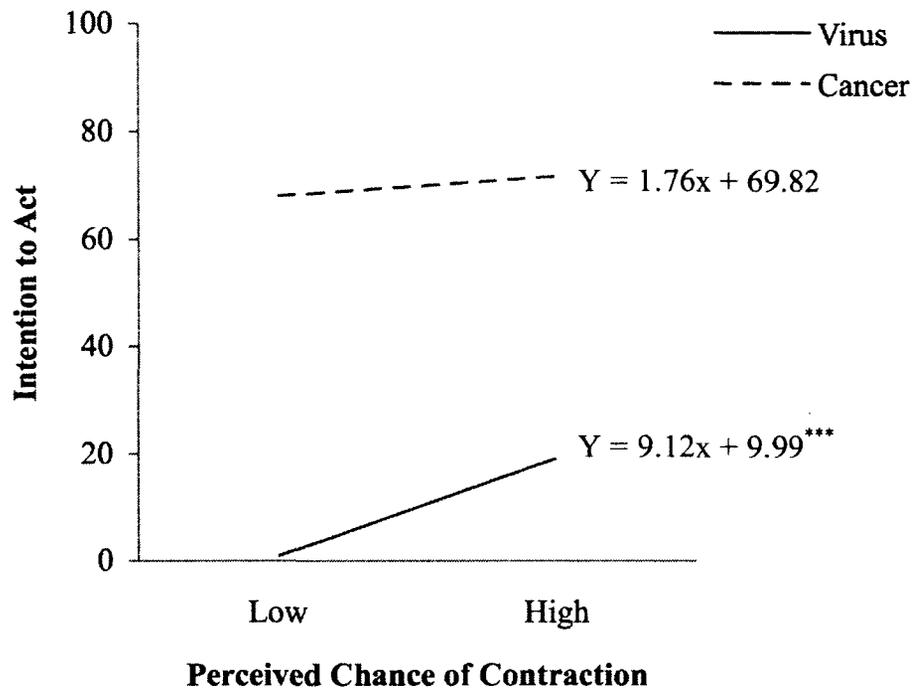


Figure 4. The intention to be screened for cancer/receive vaccination against H5N1 as predicted by beliefs regarding contraction chances, and moderated by illness.

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

Discussion

The number of deaths from the 1918 influenza pandemic has been estimated to be in the range of 50 million individuals (3% of the population at that time). In this instance deaths were a result of a viral strain that had a fatality rate of approximately 20% among those who contracted the illness (Wolfe, 2011). In contrast, though few humans have contracted H5N1, it has been established that this virus possesses a fatality rate of approximately 60%, and thus would most certainly be more devastating to the population than the number of cancer mortalities each year (an estimated 10,000 deaths will occur in Canada in 2012 from breast and prostate cancer combined; Canadian Cancer Society, 2011a, 2011b). Over the past decade, viral illnesses have repeatedly threatened the health of the Canadian public and pandemic levels of contagion were reached in the case of H1N1. Despite repeated warnings regarding the threat of a viral pandemic, individuals tended to minimize the hazard presented by these viruses, and have been reluctant to receive protection against them (e.g., Elledge et al., 2009; Maltezou et al., 2010). The present study was conducted to determine individuals' perceived risk of contracting a viral illness and the factors that governed these perceptions. As well, we assessed comparable perceptions in relation to a disease, namely that of breast and prostate cancer, which have relatively high rates of morbidity, but for most individuals still involves considerable uncertainty.

Despite similar levels of reported personal control and coherence of the illnesses in the present study, participants believed they had a significantly greater chance of developing cancer than they did of contracting H5N1, and reported that they would feel more anxiety if they did have cancer, than the anxiety they would feel in regards to the

virus. The exaggerated perceptions of cancer risk support those reported previously wherein women believed they had a greater chance of developing and dying from breast cancer compared to heart disease, Alzheimer's disease, and osteoporosis (Covello & Peters, 2002) and are also in line with findings related to the common sense model of illness which predicted that more severe perceptions of a disease are related to negative psychological outcomes (Moss-Morris et al., 1996; Kaptein et al., 2006; Traeger et al., 2009). Participants also believed that cancer would be a chronic illness with more severe consequences and a greater emotional toll than that which would be experienced in relation to H5N1. These perceptions of cancer severity are not surprising and likely were attributable to cancer being more prevalent than severe viral illnesses, and because of the extensive attention cancer has received through news outlets, which are known to influence public perceptions of disease severity and prevalence (Berry, Wharf-Higgins, & Naylor, 2007). Indeed, breast and prostate cancer are in the top three cancers most often mentioned by the Canadian media (Musso & Wakefield, 2009), and it has been argued that they received a disproportionate amount of coverage compared to illnesses with greater mortality rates, such as heart disease (Covello & Peters, 2002; Trumbo et al., 2007).

It is unlikely that the ambivalence regarding viral illness was solely related to limited media coverage, as viral illness such as SARS and H1N1 were cited daily by media outlets in the weeks before and during their peak period of impact. It may however, be an issue of relevance, particularly as the majority of participants in the present study had a close family member who had developed cancer, whereas a much smaller proportion knew anyone who had contracted H1N1, and typically this individual

was at a greater familial distance to the participant than the person who had developed cancer. Though a family history of either illness was controlled for, the prevalence of cancer ensures that even without a family history, participants have an understanding of the mortality implications of a cancer diagnosis, and the peril that treatment for this disease can bring (Clarke & Everest, 2006). In contrast, despite medical reports that H5N1 could produce extensive mortality rates in a very short period of time (Christophersen & Haug, 2006; Moxnes & Christophersen, 2006; Osterholm & Kelley, 2012), contracting the virus may be perceived by some individuals to be as benign as dealing with a seasonal cold. Understandably, the emotional implications and the hazards of treatment in relation to cancer would elicit a fear of having to deal with that illness. Unfortunately, a viral pandemic will not afford individuals the same opportunity for reflection. By the time a virus has spread to a level where most Canadians have a family member that has been infected (and thus perceive H5N1 to actually be a threatening illness) it may be too late to prevent the pandemic from causing mass deaths, as in the case of the 1918 Spanish Flu (Johnson & Mueller 2002; Osterholm & Kelley, 2012).

Interestingly, in contrast to cancer, a vaccine typically exists which prevents a viral illness from affecting members of the public. Though sometimes surrounded by controversy, receiving vaccination against a virus ensures that the inoculated individual will not get sick and will prevent the spread of the disease to their friends and family (Wolfe, 2011). Participants in the present study believed that treatment could control H5N1 to a greater degree than treatment could control cancer. Nevertheless, participants indicated that they were more likely to get screened for cancer, than they were to receive a vaccine for H5N1. Essentially, participants indicated that they were willing to undergo

an uncomfortable mammography procedure or a prostate exam even though it provides no protection against cancer and only acts as a diagnostic tool, although early detection may have benefits for the treatment outcome (Canadian Cancer Society, 2011a, b). Thus, it appears that participants were more likely to want to confirm whether or not they had already developed an illness (at which point further action could be needed which could be quite invasive), than they were to ensure protection for themselves from an illness by receiving a relatively non-invasive injection. These findings support the common sense model of illness according to which the perception of an illness determines the actions individuals would take to respond to a disease (Cameron et al., 2000), and hence ought to be modifiable through education programs. Furthermore, the findings regarding future intentions for screening/vaccination were not related to how health conscious or active an individual was, again suggesting that the perception of the illness in question may have the greatest influence on action (Covello & Peters, 2002).

The findings of the present study were consistent with those of Study 1 and 3 showing that regardless of the illness (viral or cancer), participants believed that relative to themselves, their close friends and members of the general public were at greater risk for developing a disease. In this regard, the chances of contraction by their close friends were also lower than that of the general population (immunity by proxy). This finding is consistent with those reported in relation to the perceived reduced personal risk for developing skin cancer among those spending time in the sun (Clarke et al., 1997), and lung disease among those who smoke (McKenna et al., 1993), when compared to the broader population. This said, as previously reported (Covello et al., 2002), in the current study the chances of developing cancer were perceived as being significantly greater than

the perceived chance of contracting H5N1. Thus, while participants may once again have displayed an optimism bias for themselves, and extended it to their close friends as well, they still maintain the perception that cancer would affect more people than a virus.

This optimism bias may have been present as participants in the current sample reported being very oriented towards protecting their health and actively sought information about illnesses. Not only did participants exhibit a high level of knowledge of the factors that influence and improve one's health, but they also reported engaging in these activities fairly often. As in previous studies (Dutta-Bergman, 2004; Redmond, Baer, Clark, Lipsitz, & Hicks, 2010), individuals who actively sought health information from the Internet, newspaper or family members possessed a greater health orientation and were more likely to lead a healthy lifestyle. In contrast, those who received their health information from television were less health oriented, and less likely to act to maintain/protect their health (Dutta-Bergman, 2004). These findings suggest that health agencies may need to consider tailoring their message to the medium through which it is provided. Health messages provided through the television may have to incorporate a persuasive element that engages the consumer beyond passively being exposed to the information, and encourages them to partake in the preventative behaviours being recommended. The importance of framing messages in terms of gain or loss to encourage vaccine uptake has been addressed previously in relation to avian flu (Bridget, 2008). However, these findings may have to be extended so that they also address the specific medium through which the individual is receiving the message, which may increase the efficacy of the intended suggestions.

As previously observed (Moorman et al., 1993), in the present study, an individual's health consciousness was not a significant predictor of the actions they planned to take in the future to address their health. Thus, while individuals may attempt to seek out health related information, and are concerned with protecting their health, other factors may be at play in determining their motivations to actually participate in the protective action. It has been suggested that self-efficacy and the value attributed to protective behaviours are strong indicators of whether or not an individual will pursue recommended treatment (Jayanti & Burns, 1998; Rogers, 1975; Rosenstock et al., 1988).

A limitation of the present study is that although individuals cited the Internet as the most frequented source for health information, it is not known the exact websites they were accessing to retrieve their health information. The broad information on the web and the lack of barriers to the information are both advantageous to those looking for answers, but also raise concerns regarding validity. Internet searches have allowed for information to be accessed at any time and to whichever degree of detail the reader desires (McMullen, 2006), but disreputable information may easily be obtained from the web (Weber et al., 2009). Thus, public health agencies may have to work either to ensure their presence on the Internet is more prominent, or to provide guidelines that the public can use to discern the validity of the information they are retrieving from any website.

Additionally, as frequently observed in other studies, males seemed to be less likely to participate than females. As the sample size for males in the present investigation was particularly small, caution must be used when interpreting or generalizing results.

In sum, the results of the current study indicated that cancer, a prevalent illness, was perceived to be a greater threat than that of H5N1, a potentially ubiquitous transmittable illness. Furthermore, individuals were very likely to be screened for cancer whereas they were very unlikely to receive vaccination against H5N1, though it would provide a guarantee that it would preclude the viral illness. Thus, government health agencies may need to work to alter the way the public views a viral threat, in order to motivate large numbers of the population to engage in vaccination.

General Discussion

Within the last decade, H5N1 (a virus that is exceptionally lethal, but does not transmit very well) and H1N1 (a virus that is not very lethal, but has very high transmission rates) have both lead to a number of deaths (Centre for Disease Control and Prevention, 2012). Virologists agree that with the global travel that is now common, viral pandemics are likely to continue to occur (Li et al., 2010; Toner 2010). Should these illnesses meet in the same host and combine such that, the fatality rate is inherited from H5N1, and the transmission rate is inherited from H1N1, a catastrophic global event will ensue (Wolfe, 2011). To be sure, the likelihood of these two combining naturally (or in a laboratory in order to create a terror weapon) is uncertain, but two recent reports have revealed that only five mutations were needed to engineer a version of H5N1 that could potentially be transmitted from one human to another (Herfst et al., 2012; Imai, 2012). Moreover, researchers have discovered that viruses with two of these mutations are already frequently present in birds, and mathematical modeling has suggested the three remaining mutations could occur in as little as a single human host, resulting in a highly transmissible and lethal virus (Russell et al., 2012).

When such a contagious illness does appear, such as the combined H1N1 and H5N1 strain, vaccination of a critical percentage of the population will be essential in limiting the spread of the virus, and thus preventing mass deaths (Yang et al., 2009). Yet, in response to the recent H1N1 pandemic the rates of inoculation across countries were exceptionally low, despite the repeated calls for individuals to be vaccinated. Indeed, within Canada, only 41% of the population was eventually vaccinated against H1N1 (Statistics Canada, 2010). The present studies were conducted to determine what factors

might have been associated with the choice to be inoculated or not. This included analyses of how individuals appraised uncertain viral threats, the psychological impact that such an ambiguous situation had on individuals' experiences of worry and anxiety, their ability to tolerate uncertainty, the trust held in the media, and the behaviours participants were willing to engage in to protect themselves.

Overall, the studies revealed low levels of concern pertaining to viral illness, and low intentions to receive vaccination in this regard. These findings were consistent across studies, including Study 1, which was conducted while the H1N1 pandemic was actually occurring, and in Studies 3 and 4, which were concerned with other viral illnesses that could potentially occur in the future. Indeed, it seemed that perceptions of viral illnesses were consistent regardless of whether the virus was one that had occurred previously (H1N1), a well publicized virus that could potentially transform into one that could be transmitted among humans (H5N1), or a virus that was fictional and hence participants would have been entirely naïve as to its features other than the information provided in the study (D3N4). However, the ways individuals' appraised cancer, which is much more within the realm of possibly affecting participants, was very different than that of a viral threat. Individuals believed that they, their close friends and the general public were approximately 15-25% more likely to develop cancer than they were to contract H5N1. Understandably, at least to some extent, individuals had greater intentions to determine whether they had already developed cancer through screening, than they were to ensure their health by being vaccinated against H5N1. Yet, being vaccinated might be viewed as simpler and less intrusive than being tested for breast or prostate cancer, and the consequences of contracting a virus (in terms of transmitting this

virus to a loved one) are, in a sense, more profound than that of being diagnosed with cancer.

There are likely multiple factors that contributed to the appraisals of viruses as being only moderately threatening, as well as the apparent reluctance to be vaccinated. Interestingly, during the 2009 pandemic, the expressed belief as to whether individuals would contract the illness was *not* related to their intentions regarding vaccination. Likewise, individuals' knowledge concerning the virus was unrelated to their vaccination decision. Instead, as observed by others (Larson et al., 2010; Wolfe, 2011), the low levels of vaccination intention were related to mistrust regarding the information that was provided by the media regarding the viral threat. Specifically, many participants felt that the information provided by the media was sensationalized or confusing. Additionally, one third of the participants did not trust the media to provide accurate information regarding H1N1, as previously reported in relation to avian flu (Elledge et al., 2009; Paek et al., 2008). It was suggested the media might have promoted the mistrust individuals reported by overwhelming the public with dramatic threats, such as terrorist attacks and financial hardships (e.g., Atkin et al., 1990; Havice-Cover et al., 2009; Hawkes et al., 2009), and also viral threats that did not materialize to the extent forewarned (e.g., SARS, Avian Flu, and West Nile disease). Essentially, individuals might have experienced 'flu fatigue' and thus ceased to perceive the seemingly endless warnings to be credible (Bennett et al., 2008; Wolfe, 2011).

The present investigation also revealed that individuals expressed a sense of invulnerability, which might have contributed to their choice not to engage in recommended protective behaviours regarding a viral threat. It has been reported that an

individuals' perception of their personal risk determines future behaviours to a greater extent than does the actual risk calculated and disseminated by professionals (Hevey, 2005). As observed in relation to difficulties with alcohol (Dillard et al., 2009), smoking-related illnesses (McKenna et al., 1993), and sun protection behaviours (Branstrom et al., 2005), participants consistently displayed an optimism bias in so far as they believed their own personal chance of contracting a viral illness were significantly less than that of their close friend becoming ill. Furthermore, it seemed that participants also extended the unrealistic invulnerability to their close others as they perceived their friends to be 15-20% less likely to contract a viral illness compared to a member of the general public. Identical trends were evident in relation to the perceived chance of developing breast or prostate cancer, which was consistent with previous findings of an optimism bias in relation to risk and mortality regarding these cancers (Clarke et al., 2000). Interestingly, although a sense of vulnerability is often assumed to be most prominent in adolescent or college-aged individuals (Cohn et al. 1995), in the present investigation this bias was comparable across all ages. The bias observed was either not related to feeling of invulnerability that is unique to younger people, or specifically involved processes that were related to the perceived diminished risk and severity of H1N1.

An optimism bias, as previously observed, has been found to be positively correlated with perceptions of control (Klein et al., 2002). It was particularly interesting, although somewhat incongruous, that participants who reported the greatest sense of self-control in regard to the H1N1 virus were least likely to be inoculated. It might have been expected that the sense of control would manifest in terms of becoming vaccinated - instead, it appeared as if those individuals who felt a sense of control chose not to be

vaccinated, as by dint of their own control they could avoid infection. It was also observed that feelings of control over this stressor was, in fact, fairly common, and was greater than the threat that the potential pandemic elicited. Moreover, the present findings were in line with the view that those individuals who believed that they had control over the illness experienced lower levels of anxiety (Diehl et al., 2010; Ruthig et al., 2007). It is also possible that these perceptions of control were a result of participants inaccurately believing that H1N1 virus did not pose a serious threat. In fact, despite official confirmation from the World Health Organization that H1N1 had reached the criteria for being classified as a pandemic (WHO, 2009), a majority of participants believed that 10% or less of the population would contract H1N1 during the event, and only 13.29% of participants questioned six months following the peak of the virus believed the experience had been that of a pandemic.

It has been reported that personal experience influences perception of illnesses or the probability of being affected by an illness (Cameron & Leventhal, 2000; Mishel 1990). As such, it might be expected that these individuals would respond in a similarly modest manner to subsequent pandemic threats. The limited personal impact the virus had on most individuals might account for their weak reactions to the threat (i.e., failure to be vaccinated), and might also contribute to their perceptions of invulnerability, thus presenting a source of concern for future pandemics. According to the uncertainty in illness perspective, if comparisons to previous experiences are positive (i.e., the previous conflict did not have a negative outcome), an assumption is made that the new threat can be handled similarly (Mishel, 1990). Thus, individuals might continue to minimize the impact that a viral event can have, and hence might again choose not to be vaccinated.

Though individuals might minimize the personal impact of a viral illness, a great deal of global uncertainty was experienced during a pandemic threat (Elledge, 2008) and intolerance of uncertainty has been reported to be associated with elevated anxiety (Rosen et al., 2007). In line with these reports, in the present investigation, intolerance of uncertainty predicted a potential viral threat to be stressful, and was associated with feelings of low control and elevated anxiety. Unexpectedly, however, the inability to tolerate uncertainty did not translate into action, as it was not a significant predictor of future intentions to be vaccinated or receive cancer screening. Apparently factors other than uncertainty were more pertinent in relation to vaccination intent, at least under conditions where the threat of the virus was moderate. The possibility might be entertained that with greater viral threat or more serious illness associated with the virus, the contribution of intolerance of uncertainty would be greater. However, intolerance of uncertainty was not related to engaging in preventative behaviours in regard to screening for cancer, an illness that participants perceived to be a severe threat.

Beyond the uncertainty regarding the contraction of an illness, there is another aspect of uncertainty that should be considered. Specifically, many treatments, particularly those of a pharmacological nature, may have untoward side effects. Some of these may be minor or appear under unique, but known conditions, whereas others might be entirely unpredictable. In the case of the H1N1 vaccine there was considerable uncertainty regarding the safety of the inoculation, especially as production had been rushed (Maltezou et al., 2010; Thoon & Chong, 2010). Reports from public health agencies that ensured the vaccination had been adequately tested were contradicted by media outlets reporting dangerous side effects of inoculation, or ulterior motivations for

production of the vaccine (i.e., increased profits for pharmaceutical companies; CBC 2010; Gostin 2009; Larson et al., 2010). Moreover, it was reported in the media that a swine flu vaccine administered in the 1970's had negative side effects that included Guillain Barré syndrome (CDC 2009). Essentially, a considerable degree of uncertainty surrounded the risk: benefit ratio that vaccination might have held. Individuals, in effect, may have varied in the ability to tolerate the uncertainty related to the safety of the H1N1 vaccine. Thus, they were not only left to feel anxious about the threat of H1N1 contraction, but also to question what the appropriate action was with respect to inoculation. This situation may reflect the 'emotional fear control' processes delineated by the parallel processing model of health, which suggests that both emotional and cognitive appraisal processes are fundamental in relevant decision making. In this scenario, individuals focus on coping with the emotions elicited by the situation (e.g., the negative feelings of uncertainty), and thus aren't able to concentrate their cognitive or behavioural efforts on actually dealing with the danger of the presenting threat (Witte, 1994). Similarly, the health belief model posits that individuals will only engage in protective actions if the benefits of the behaviours outweigh the 'barriers' (Rosenstock, 1974). Due to the uncertainty related to the H1N1 vaccination, it is possible that participants were unable to compare the benefits and barriers accurately as they could not ascertain which information could be trusted.

It has been reported that when making decisions during a period of uncertainty, response latencies increase, as does the amount of attention paid to the various consequences of a given decision (Busemeyer & Townsend, 1993). Likewise, as the complexity of information available for decisions increases or as uncertainty increases, so

do the latencies to respond (Baranski & Petrusic, 2003). The results of the present investigation were, in a fashion, reminiscent of these findings. Specifically, it was observed that those individuals who were vaccinated did so relatively quickly, whereas those who were undecided received their vaccination at lengthier delays, if at all. During the pandemic, equal proportions of participants had received the vaccination, had decided against it, or were unsure about their intentions. In the spring following the peak of the pandemic (while vaccination was still available) more than half of the participants had decided against vaccination (55.38%), whereas the proportion of those vaccinated remained at one third. Furthermore, when participants were asked about H1N1 vaccination in 2012, the percentage of those who had *not* been vaccinated was 65.69%. In effect, most individuals that were vaccinated received the treatment within the first months of the pandemic, after which relatively few individuals were inoculated. Thus, strategies to ensure that individuals are vaccinated might benefit from targeting those who are undecided about their health behaviours. It is also possible that in the case of the H1N1 pandemic, as individuals weighed the pro and cons of vaccination, the prevalence of the illness declined. It is not certain if those who were undecided about vaccination made a conscious decision against it, or if it simply became a non-issue as the incidence of the virus declined. Should a more contagious viral strain appear in the future, those individuals who are indecisive might not reap the benefit that they had in relation to H1N1. A failure to decide one's vaccination intention quickly may result in contraction of a potentially fatal illness. Thus, moving forward, it will be essential for vaccination to be made available promptly, and for individuals to be provided with all the necessary information in a timely manner in order for them to make an educated decision swiftly.

Finally, the strategies that individuals use to cope with the threat presented by a viral strain may also have repercussions for the behaviours they are willing to endorse. Participants who engaged in avoidance coping to deal with the threat of H1N1 were least likely to receive vaccination, whereas those who utilized problem-focused coping were most likely to endorse this protective behaviour and also reported decreased experiences of anxiety. Though emotion-focused coping was not related to vaccination intentions, it was a significant positive predictor of anxiety. The endorsement of emotion-focused coping to deal with the fear of a viral pandemic was not effective, and, as previously suggested, may at times be counterproductive (Anisman, Merali, & Hayley, 2008). Improving the public's understanding of the risks presented by both a viral illness and a vaccine might diminish the emotional components of the situation and allow them to cope in a more fruitful manner.

Conclusion

Understanding how individuals appraise uncertain health threats is of considerable importance to public health agencies and their efforts to communicate preventative behaviours to the public. Adherence to protective measures may not only be critical for the safety of each individual, but has important ramifications when the spread of disease is dependent on a significant percentage of the public being inoculated. Beyond the importance of ensuring the physical health of the population, the threat of an uncertain viral event has been shown to have implications regarding public anxiety, particularly among those who cannot tolerate uncertainty and perceive the illness to present a considerable threat.

Mistrust of the media and an optimism bias might have contributed to increased, and perhaps faulty, perceptions of control during a pandemic, preventing participants from acknowledging the potential severity a virus may possess, and from heeding recommendations to protect themselves. Based on the findings of the present investigation, several recommendations can be offered that might be useful from a public policy perspective. Ultimately, at this time, the public either distrusts the information provided by media outlets, or finds it to be sensationalized or confusing. Therefore, in the short term, information regarding health threats might be best conveyed to the public by physicians or other medical health professionals. Indeed, although an abundance of health information is available on the Internet, individuals prefer to receive this type of information from their physician, and report greater trust in the information when it comes from an esteemed source (Hesse et al., 2005). Information transmitted on a more intimate level and from a more trusted source might lead to more appropriate appraisals of a viral threat, and thus increase adherence to recommended health behaviours. While this endeavour might be taxing and places a great deal of responsibility on front-line physicians, the effort would be worthwhile if knowledge is transferred to the public more accurately, and with a greater degree of acceptance. In the face of a mutated H5N1 strain that could spread through the population very quickly, all efforts to maximize understanding of the importance of vaccination would be warranted.

However, the transmission of information by the media is ultimately more efficient; subsequently, media outlets must work to increase the trust the public has in the information provided. To be sure, accurate reports must navigate between providing information that has enough impact to garner the attention of the public and elicit action

without creating hysteria (Sandman, 2009), though this delicate balance may also depend on the factual information provided to the media by public health agencies. It has been suggested in relation to previous viral threats, that public agencies have reacted to, as opposed to prevented, the events; and the H1N1 pandemic motivated many research groups to alter this pattern (Yong, 2012). Efforts have been elicited by virologists and public health groups to establish worldwide communication networks so that the activity of viruses can be monitored at all times (e.g., Global Viral Forecasting, International Severe Acute Respiratory Infection Consortium). Thus, if illnesses do begin to peak in a given area, immediate action can be taken to minimize the opportunity for transmission. This monitoring will also determine which viruses present the greatest potential threat, and will allow for production of vaccines to begin relatively early. Furthermore, information is being collected from rural areas where the potential for viruses to jump from animals to humans is greatest, which can also allow for threats to be identified before they present a risk to the world population (Wolfe, 2011).

According to the protection motivation theory, in order for individuals to protect themselves they must perceive the threat to be severe, they must believe the threat will affect them personally, and they must believe that the protective action will be effective (Rogers, 1975). Thus, it is understandable that disbelief regarding a virus actually reaching a pandemic level, coupled with an optimism bias, would act against individuals being vaccinated. Likewise, questions regarding vaccine safety must be ameliorated in order minimize the apathy felt towards viral threats. Improving the accuracy of the information provided to media outlets, and having the media transmit this information in a comprehensive manner might allow the public to put more faith in the information

received. Ultimately, information that is concise, clear, simple, and appraised to be evidence-based will be best received by the public, and will elicit the greatest degree of adherence to the necessary preventative behaviours.

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Appendix A Study 1 and Study 2 Informed Consent

The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent has to provide sufficient information such that you have the opportunity to determine whether you wish to participate in the study.

Study Title: Response to threat of H1N1

Study Personnel:

Dr. Kim Matheson (Faculty Investigator, 520-2600 ext. 2684) kim_matheson@carleton.ca

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Sheena Taha (Graduate Researcher, 520-2600 ext. 7513) staha@connect.carleton.ca

If you have any ethical concerns about how this study was conducted please contact:

Dr. Monique Sénéchal, monique_senechal@carleton.ca (613-520-2600 ext. 1155).

If you have any other concerns please contact: Dr. Janet Mantler,
janet_mantler@carleton.ca (613-520-2600 ext. 4173).

Purpose and Task Requirements: The purpose of this project is to evaluate your knowledge about H1N1, perceptions of who is most vulnerable to the illness, awareness and intent to take the precautionary measures, as well as general appraisals, coping strategies, and psychological distress associated with the threat of H1N1. In order to participate in this study you will complete a series of measures on-line, which will take approximately 30 minutes. When you have completed the survey you will be eligible for a \$5 gift certificate to either Tim Horton's or Starbucks. Please note, that in order to receive your gift certificate, your answers must be deemed valid. Individuals who respond randomly to the questions will not receive a gift card.

Potential Risk and Discomfort: There are no physical risks in this study. You may experience some anxiety when reflecting on issues associated with contracting H1N1.

Anonymity/Confidentiality: The data collected in this study will be kept confidential. Because we will want to keep track of your answers in this questionnaire in relation to possible later reactions you might have (if you agree participate in a follow up), we will have to be able to identify who you are on your questionnaire. However, we take special precautions to make sure that no one else will be able to identify you or what your responses were. Your personal information will be stored in a separate file from your questionnaire responses. Only your chosen "id name" will identify your questionnaire.

Right to Withdraw: Your participation in this study is entirely voluntary. At any point during the study you have the right not to complete certain questions or to withdraw from the study without any penalty whatsoever.

This study had been approved by the Carleton University Ethics Committee for Psychological Research.

I have read the above description of the study. The data collected will be used in research publications and/or for teaching purposes. My sign-in indicates that I agree to participate in the study, and this in no way constitutes a waiver of my rights.

Appendix B Study 1 and Study 2 Debriefing

What are we trying to learn in this research?

The looming threat of the H1N1 virus has repercussions for the general distress that might be experienced by all individuals, depending on their concerns about levels of risk for themselves and those close to them. Moreover, individuals' knowledge and actions will clearly determine their mental and physical health as the next wave of H1N1 arrives. The 14-25 age group appears to be at particularly high risk for contracting the virus, and hence their responses to intervention efforts are of considerable concern. We are interested in evaluating students' knowledge about H1N1, perceptions regarding who is most vulnerable to the illness, awareness and intent to take the precautionary measures, as well as general appraisals, coping strategies, and psychological distress that might predict responses to the threat.

Where can I learn more?

Carleton Updates	www.carleton.ca/communications/news/swineflu/
World Health Organization	www.who.int/csr/disease/swineflu/en/
Ontario Ministry of Health	www.ontario.ca/flu

What if I have questions later?

Please contact:

Sheena Taha, Graduate Researcher, 613-520-7513, staha@connect.carleton.ca

If you have ethical concerns about the study please contact:

Dr. Monique Sénéchal, Chair of Carleton University Ethics Committee for Psychological Research, 613-520-1155, monique_senechal@carleton.ca

Any other concerns:

Dr. Janet Mantler, Chair of Carleton University Psychology Department, 613-520-2600, ext. 4173 janet_mantler@carleton.ca

Is there anything that I can do if I found this experiment to be emotionally draining?

Thank you very much for your participation in this study. If you have experienced any distress while completing these measures, or would like more information regarding H1N1 please contact one of the following Health Agencies:

Carleton Health and Counselling Services	www.carleton.ca/health	613-520-6674
Ontario Ministry of Health	www.health.gov.on.ca	1-800-268-1153

Appendix C Knowledge and Perceptions of H1N1

1. How would you rate your knowledge of symptoms related to H1N1?

1	2	3	4	5
I know nothing about H1N1				I have a lot of knowledge about H1N1

2. Which of the following are symptoms you would have to experience in order to stay home from work/school because you think you might have H1N1? *Check all that apply.*
 - abdominal pain
 - chest pains
 - chills
 - constipation
 - cough
 - diarrhea
 - fatigue
 - fever
 - frequent urination
 - headache
 - increased appetite
 - loss of appetite
 - muscle ache
 - nausea
 - runny nose
 - skin irritation
 - sneezing
 - sudden weight loss
 - throat irritation
 - vomiting
 - watery eyes

3. Which of the following are symptoms you would have to experience in order for you to seek medical help because you think you might have H1N1? *Check all that apply.*
 - abdominal pain
 - chest pains
 - chills
 - constipation
 - cough
 - diarrhea
 - fatigue
 - fever
 - frequent urination

headache
 increased appetite
 loss of appetite
 muscle ache
 nausea
 runny nose
 skin irritation
 sneezing
 sudden weight loss
 throat irritation
 vomiting
 watery eyes

4. In your conversations with your friends, which of the following would be topics of discussion that you would engage in? *Check as many as apply to you.*
- events in town
 - recycling and environmental behaviors
 - impending H1N1 pandemic
 - ways of staying healthy (i.e., eating better, exercise activities)
 - sports events
 - volunteer activities
 - romantic relationships
 - upcoming parties
 - things going on at work/school
 - your family
5. Which of the following would make you worry that you might have been exposed to H1N1? *Check all that apply.*
- skin contact with a stranger
 - being kissed in a greeting
 - someone sneezing or coughing within a few feet of you
 - being in a confined space with someone who looked ill (i.e. bus, plane)
 - eating pork
 - eating poultry
 - contact with inanimate objects in public settings (i.e. door handles, keyboards, etc.)
6. Which of the following would you *avoid* out of concern of getting H1N1? *Check all that apply.*
- skin contact
 - shaking hands or giving a greeting kiss on the cheek
 - kissing on a date
 - sex
 - entering confined or crowded spaces
 - eating pork

eating poultry
 contact with inanimate objects in public settings (i.e. door handles, keyboards,
 etc.)

Taking courses on campus
 People who are high risk
 Spend less time in contact with other people
 public transportation
 travel plans
 visiting doctor's office
 None

7. Which of the following are you currently doing to avoid getting H1N1? *Check all that apply.*

washing hands
 using hand sanitizer
 wear facemask
 having regular checkups
 using condoms
 cleaning common surfaces
 working from home

8. If you get H1N1, how serious do you think the symptoms will probably be?

very mild. I could just stay home and catch up on stuff.
 like a normal flu. I would stay in bed for a few days and take care of it.
 serious. Would put me out of commission for at least a week.
 very serious. Would feel extremely ill, and would need to seek medical help.
 extremely serious. Life-threatening.

9. If you get H1N1, what do you believe the chances are that you will pass it on to someone else? *Put a mark at the level you think the chances are.*

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

10. If you get H1N1, who is the most likely person you think you'd pass it on to?

my roommate
 a close friend at school
 my partner
 a sibling. If you check this, how old is this sibling? _____
 my child(ren). If you check this, how old is this child(s)? _____
 a parent
 a grandparent
 other *Please specify* _____

11. If you think of the person you'd be most likely to pass the H1N1 virus on to, how serious do you think their symptoms would probably be?

- very mild. S/he could just stay home and catch up on stuff.
- like a normal flu. S/he could stay in bed for a few days and take care of it.
- serious. Could put her/him out of commission for at least a week.
- very serious. Could become extremely ill, and would need to seek medical help.
- extremely serious. Life-threatening.

12. Of the people you could pass H1N1 on to if you were to get it, what do you believe the chances are that one of those people would come down with very or extremely serious symptoms? *Put a mark at the level you think the chances are.*

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

13. Have you had, or do you plan on getting, the H1N1 vaccine?

- Yes
- No
- Have not decided

14. Have you had, or do you plan on getting, the regular flu shot this season?

- Yes
- No
- Have not decided

15. If you know someone who comes down with H1N1, how long do you believe they are contagious after symptoms have begun?

- not at all once symptoms appear
- 1-2 days
- 3-5 days
- about a week
- about 10 days to 2 weeks

16. If you personally were exposed to someone who was infected with H1N1, how long do you think it would be before you would show symptoms if you have been infected?

- within hours
- 1-2 days
- 3-5 days
- about a week
- about 10 days to 2 weeks

17. If you have been infected with H1N1, how long do you think you would be a possible transmitter of the virus to others prior to symptoms appearing in you?
- about a week before symptoms appear
 - about 2-5 days before symptoms appear
 - about a day before symptoms appear
 - not at all until symptoms appear
18. What do you believe the chances are of someone close to you contracting H1N1?
Put a mark at the level you think the chances are.
- 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
19. What do you believe your personal chances are of contracting H1N1? *Put a mark at the level you think the chances are.*
- 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
20. Which age group do you think is most vulnerable to contracting H1N1?
- 2 years and younger
 - 3-13 years
 - 14-25 years
 - 26-40 years
 - 41-60 years
 - 61 years and older
21. Which of the following do you think are risk factors for contracting H1N1?
Please check all that apply.
- Overweight
 - Previous health condition
 - Pregnancy
 - Sexual orientation
 - Being sexually active
 - Low physical activity
 - Other *please specify:* _____
22. Which of the following do you think apply to you? *Please check all that apply.*
- Overweight
 - Have a health condition that puts you at risk
 - Pregnant
 - Sexual orientation
 - Sexually active
 - Low physical activity

23. Have you ever had any of the following? *Please check all that apply.*

- Pneumonia
- Influenza
- Malaria
- Chicken pox
- Measles
- Asthma
- Major depressive disorder
- Posttraumatic stress disorder
- Generalized anxiety disorder
- Cardiovascular illness (of any sort)
- Immune-related disorder (i.e. arthritis, lupus)
- Allergies

24. How much do you currently worry about contracting H1N1?

- | | | | | |
|------------|---|---|---|-------|
| 1 | 2 | 3 | 4 | 5 |
| Not at all | | | | A lot |

25. At what point would you become concerned about contracting H1N1?

- When at least one person I know contracts H1N1
 - When more than one person I know has contracted H1N1
 - When 10% of the Canadian population is infected
 - When 25% of the Canadian population is infected
 - When 50% of the Canadian population is infected
 - When the government declares an epidemic in Canada
 - Never
 - Other *please specify:*
-

26. How serious do you think the spread of H1N1 will be in Canada?

- Less than 10% of the population will be infected
 - 10% of the Canadian population will be infected
 - 25% of the Canadian population will be infected
 - 50% of the Canadian population will be infected
 - H1N1 will be a severe and deadly epidemic in Canada
 - Other *please specify:*
-

27. What do you believe the chances are of the following groups contracting H1N1?

Use the scale below and place the corresponding number beside the group.

- | | | | | |
|------------|--------|------------------|------------------|-----------------|
| 1 | 2 | 3 | 4 | 5 |
| Not at all | Rarely | Moderate chances | Likely to happen | Most definitely |

	will happen
Asians (i.e. Chinese, Japanese, Korean)	_____
South Asians (i.e. East Indian, Pakistani, Punjabi, Sri Lankan)	_____
South East Asians (i.e. Cambodian, Indonesian, Laotian)	_____
Arabs	_____
Blacks	_____
South/Latin Americans	_____
Mexicans	_____
Aboriginals	_____
Australians & New Zealanders	_____
Europeans	_____

28. What do you believe to be the chances of the following religious groups contracting H1N1?

Use the scale below and place the corresponding number beside the group.

1	2	3	4	5
Not at all	Rarely	Moderate chances	Likely to happen	Most definitely will happen
Atheists				_____
Agnostics				_____
Protestants				_____
Catholics				_____
Jews				_____
Muslims				_____
Buddhists				_____
Hindus				_____
Sikhs				_____
Baha'is				_____

29. If your closest friend contracted H1N1, how likely is it that others might avoid contact with you personally?

1	2	3	4	5
Not at all				Extremely likely

30. If you were to develop flu-like symptoms, which of the following would best describe how you plan to act?
- Manage symptoms and maintain life as usual (i.e. going to school/work/activities)
 - Stay home until all symptoms have subsided
 - Go to the doctor, but keep going to work/school until an official diagnosis is made
 - Go to the doctor once symptoms become serious
 - Immediately, go to emergency room
31. Do you trust the media to convey accurate information regarding H1N1?
- Yes, I believe the media reports would be true
 - Yes, but I believe it would be a little bit sensationalized
 - Yes, but I believe it would presents contradictory or confusing information
 - No, the media reports would dramatize H1N1
 - No, I don't believe anything the media reports
32. Do you trust your doctor to convey accurate information regarding H1N1?
- Yes, but I believe my doctor would be downplaying the situation
 - Yes, I believe what my doctor tells me would be true
 - Yes, but I believe my doctor would be embellishing the situation
 - No, my doctor would be too dramatic about H1N1
 - No, I don't think my doctor would be knowledgeable about H1N1
33. Do you trust your workplace/school to effectively deal with an H1N1 pandemic?
- Yes, I believe my workplace/school is well prepared
 - Yes, I believe my workplace/school is ready, but overreacting
 - Yes, but I find that my workplace/school presents contradictory or confusing information
 - No, my workplace/school has not taken adequate measures
 - No, my workplace/school has no idea what it is doing
 - I do not have a workplace, nor attend school
34. If you receive e-mail updates and alerts from your workplace/school regarding H1N1, do you?
- Read them thoroughly and bring them to the attention of others
 - Read them just to ensure you are informed
 - Read some, but not sure what they really have to do with you
 - Read some, but mostly find them useless
 - Delete them all
 - I do not have a workplace, nor attend school
35. Were there any particular concerns that you have about H1N1 that you believe have not been addressed? *Please describe.*

Appendix D Survey of Coping Profiles Endorsed (50-item SCOPE)

The purpose of this questionnaire is to find out how people deal with the fear of contracting H1N1. The following are activities that you may have done. After each activity, please indicate the extent to which you would use this as a way of dealing with your fear of contracting H1N1 in recent weeks.

Ordinarily, in recent weeks, have you...

	Never	Seldom	Sometimes	Often	Almost Always
1. accepted that there was nothing you could do to change your situation?	0	1	2	3	4
2. tried to just take whatever came your way?	0	1	2	3	4
3. talked with friends or relatives about your problems?	0	1	2	3	4
4. tried to do things which you typically enjoy?	0	1	2	3	4
5. sought out information that would help you resolve your problems?	0	1	2	3	4
6. blamed others for creating your problems or making them worse?	0	1	2	3	4
7. sought the advice of others to resolve your problems?	0	1	2	3	4
8. blamed yourself for your problems?	0	1	2	3	4
9. exercised?	0	1	2	3	4
10. fantasized or thought about unreal things (eg., the perfect revenge, or winning a million dollars) to feel better?	0	1	2	3	4
11. been very emotional compared to your usual self?	0	1	2	3	4
12. gone over your problem in your mind over and over again?	0	1	2	3	4
13. asked others for help?	0	1	2	3	4
14. thought about your problem a lot?	0	1	2	3	4
15. became involved in recreation or pleasure activities?	0	1	2	3	4

16. worried about your problem a lot?	0	1	2	3	4
17. tried to keep your mind of things that are upsetting you?	0	1	2	3	4
18. tried to distract yourself from your troubles?	0	1	2	3	4
19. avoided thinking about your problems?	0	1	2	3	4
20. made plans to overcome your problems?	0	1	2	3	4
21. told jokes about your situation?	0	1	2	3	4
22. thought a lot about who is responsible for your problem (besides yourself)?	0	1	2	3	4
23. shared humorous stories etc. to cheer yourself and others up?	0	1	2	3	4
24. told yourself that other people have dealt with problems such as yours?	0	1	2	3	4
25. thought a lot about how your have brought your problem on yourself?	0	1	2	3	4
26. decided to wait and see how things turn out?	0	1	2	3	4
27. wished the situation would go away or be over with?	0	1	2	3	4
28. decided that your current problems are a result of your own past actions?	0	1	2	3	4
29. gone shopping?	0	1	2	3	4
30. asserted yourself and taken positive action on problems that are getting you down?	0	1	2	3	4
31. sought reassurance and moral support from others?	0	1	2	3	4
32. resigned yourself to your problem?	0	1	2	3	4
33. thought about how your problems have been caused by other people?	0	1	2	3	4
34. daydreamed about how things may turn out?	0	1	2	3	4
35. been very emotional in how you react, even to little things?	0	1	2	3	4
36. decided that you can grow and learn through your problem?	0	1	2	3	4
37. told yourself that other people have problems like your own?	0	1	2	3	4

38. wished you were a strong person or better at dealing with problems?	0	1	2	3	4
39. looked for how you could learn something out of your bad situation?	0	1	2	3	4
40. asked for God's guidance?	0	1	2	3	4
41. kept your feelings bottled up inside?	0	1	2	3	4
42. found yourself crying more than usual?	0	1	2	3	4
43. tried to act as if you were not upset?	0	1	2	3	4
44. prayed for help?	0	1	2	3	4
45. gone out?	0	1	2	3	4
46. held in your feelings?	0	1	2	3	4
47. tried to act as if you weren't feeling bad?	0	1	2	3	4
48. taken steps to overcome your problems?	0	1	2	3	4
49. made humorous comments or wise cracks?	0	1	2	3	4
50. told others that you were depressed or emotionally upset?	0	1	2	3	4

Appendix E Intolerance of Uncertainty

Please indicate the degree to which each of the following statements would be characteristic for you to believe.

	Not at all characteristic of me	1	2	3	4	Entirely characteristic of me
1. Uncertainty stops me from having a strong opinion	1	2	3	4	5	
2. Being uncertain means that a person is disorganized	1	2	3	4	5	
3. Uncertainty makes life intolerable	1	2	3	4	5	
4. It's unfair having no guarantees in life	1	2	3	4	5	
5. My mind can't be relaxed if I don't know what will happen tomorrow	1	2	3	4	5	
6. Uncertainty makes me uneasy, anxious, or stressed	1	2	3	4	5	
7. Unforeseen events upset me greatly	1	2	3	4	5	
8. It frustrates me not having all the information I need	1	2	3	4	5	
9. Uncertainty keeps me from living a full life	1	2	3	4	5	
10. One should always look ahead so as to avoid surprises	1	2	3	4	5	
11. A small unforeseen event can spoil everything, even with the best planning	1	2	3	4	5	
12. When it's time to act, uncertainty paralyzes me	1	2	3	4	5	
13. Being uncertain means that I am not first rate	1	2	3	4	5	
14. When I am uncertain, I can't go forward	1	2	3	4	5	
15. When I am uncertain, I can't function very well	1	2	3	4	5	
16. Unlike me, others seem to know where they are going with their lives	1	2	3	4	5	
17. Uncertainty makes me vulnerable, unhappy, or sad	1	2	3	4	5	
18. I always want to know what the	1	2	3	4	5	

future has in store for me					
19. I can't stand being taken by surprise	1	2	3	4	5
20. The smallest doubt can stop me from acting	1	2	3	4	5
21. I should be able to organize everything in advance	1	2	3	4	5
22. Being uncertain means that I lack confidence	1	2	3	4	5
23. I think it's unfair that other people seem to be sure about their future	1	2	3	4	5
24. Uncertainty keeps me from sleeping soundly	1	2	3	4	5
25. I must get away from all uncertain situations	1	2	3	4	5
26. The ambiguities in life stress me	1	2	3	4	5
27. I can't stand being undecided about my future	1	2	3	4	5

Appendix F The Stress Appraisal Measure

This questionnaire is concerned with your thoughts about H1N1. There are no right or wrong answers. Please respond according to how you view this situation right NOW. Please answer ALL questions. Answer each question by CIRCLING the appropriate number corresponding to the following scale.

	1 Not at all	2 Slightly	3 Moderately	4 Considerably	5 Extremely
		Slightly	Moderately	Considerably	Extremely
1. Is this a totally hopeless situation?	1	2	3	4	5
2. Does this situation create tension in me?	1	2	3	4	5
3. Is the outcome of this situation uncontrollable by anyone?	1	2	3	4	5
4. Is there someone or some agency I can turn to for help if I need it?	1	2	3	4	5
5. Does this situation make me feel anxious?	1	2	3	4	5
6. Does this situation have important consequences for me?	1	2	3	4	5
7. Is this going to have a positive impact in me?	1	2	3	4	5
8. How eager am I to tackle this problem?	1	2	3	4	5
9. How much will I be affected by the outcome of this situation?	1	2	3	4	5
10. To what extent can I become a stronger person because of this problem?	1	2	3	4	5
11. Will the outcome of this situation be negative?	1	2	3	4	5
12. Do I have the ability to do well in this situation?	1	2	3	4	5
12. Does this situation have serious implications for me?	1	2	3	4	5
13. Do I have what it takes to	1	2	3	4	5

do well in this situation?					
14. Is there help available to me for dealing with this problem?	1	2	3	4	5
15. Does this situation tax or exceed my coping resources?	1	2	3	4	5
16. Are there sufficient resources available to help me in dealing?	1	2	3	4	5
17. Is this beyond anyone's power to do anything about this situation?	1	2	3	4	5
18. To what extent am I excited thinking about the outcome of this situation?	1	2	3	4	5
19. How threatening is this situation?	1	2	3	4	5
20. Is the problem unresolvable by anyone?	1	2	3	4	5
21. Will I be able to overcome the problem?	1	2	3	4	5
22. Is there anyone who can help me manage the problem?	1	2	3	4	5
23. To what extent do I perceive this situation as stressful?	1	2	3	4	5
24. Do I have the skills necessary to achieve a successful outcome to this situation?	1	2	3	4	5
25. To what extent does this event require coping efforts on my part?	1	2	3	4	5
26. Does this situation have long-term consequences for me?	1	2	3	4	5
27. Is this going to have a negative impact on me?	1	2	3	4	5

Appendix G State Anxiety

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the number to the right of the statement to indicate how you feel *right now*, this is, *at this moment*, in regards to your fear of H1N1. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat so	Moderately so	Very much
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

Appendix H Study 3 Informed Consent

The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent has to provide sufficient information such that you have the opportunity to determine whether you wish to participate in the study.

Study Title: Appraisal of a Health Threat

Study Personnel:

Dr. Kim Matheson (Faculty Investigator, 520-2600 ext. 2684)

kim_matheson@carleton.ca

Dr. Hymie Anisman (Faculty Investigator, 520-2600 ext. 2699)

hanisman@ccs.carleton.ca

Sheena Taha (Graduate Researcher, 520-2600 ext. 7513) staha@connect.carleton.ca

If you have any ethical concerns about how this study was conducted please contact: Dr. Monique Sénéchal, monique_senechal@carleton.ca (613-520-2600 ext. 1155).

If you have any other concerns please contact: Dr. Janet Mantler, janet_mantler@carleton.ca (613-520-2600 ext. 4173).

Purpose and Task Requirements: The purpose of this project is to evaluate your attitudes towards future health threats, as well as general appraisals associated with the threat of a pandemic. In order to participate in this study you will complete a series of measures on-line, which will take approximately 30 minutes. When you have completed the survey you will be eligible for a \$5 gift certificate to either Tim Horton's or Starbucks. **Please note, that in order to receive your gift certificate, your answers must be deemed valid. Individuals who respond randomly to the questions will not receive a gift card.**

Potential Risk and Discomfort: There are no physical risks in this study. You may experience some anxiety when reflecting on issues associated with a potential health threat.

Anonymity/Confidentiality: The data collected in this study will be kept confidential. Because we will want to keep track of your answers in this questionnaire in relation to possible later reactions you might have (if you agree participate in a follow up), we will have to be able to identify who you are on your questionnaire. However, we take special precautions to make sure that no one else will be able to identify you or what your responses were. Your personal information will be stored in a separate file from your questionnaire responses. Only your chosen "id name" will identify your questionnaire.

Right to Withdraw: Your participation in this study is entirely voluntary. At any point during the study you have the right not to complete certain questions or to withdraw from the study without any penalty whatsoever.

This study had been approved by the Carleton University Ethics Committee for Psychological Research. *I have read the above description of the study. The data collected will be used in research publications and/or for teaching purposes. My sign-in indicates that I agree to participate in the study, and this in no way constitutes a waiver of my rights.*

Appendix I Study 3 Second Informed Consent

Deception was used in this study as the news article you read was completely fictional. Most specifically, scientists have not concluded that there will be pandemic next winter. Additionally, all details about the strength of the new virus and the symptoms it would produce were fictionalized based on previous health reports.

Informed Consent to the Use of Data

The purpose of this informed consent is to ensure that you now understand the true purpose of the study and that you agree to allow your data to be used for research and teaching purposes. Because you were only told of the procedures and not the purpose of this study at the outset, we are now asking for your consent to allow your data to be used for research and teaching purposes.

Purpose. The purpose of this project is to evaluate your attitudes towards future health threats, as well as general appraisals associated with the threat of a pandemic.

Anonymity/Confidentiality. The data collected in this study will be kept confidential. Because we will want to keep track of your answers in this questionnaire in relation to possible later reactions you might have (if you agree participate in a follow up), we will have to be able to identify who you are on your questionnaire. However, we take special precautions to make sure that no one else will be able to identify you or what your responses were. Your personal information will be stored in a separate file from your questionnaire responses. Only your chosen “id name” will identify your questionnaire.

Right to withdraw data. You have the right to indicate that you do not wish your data to be used in this study. If you indicate this is your choice, then all measures you have provided will be destroyed.

Please select one of the following:

I have read the above description of the study. The data collected will be used in research publications and/or for teaching purposes. By ticking this box, I am indicating that I agree to participate in the study, and this in no way constitutes a waiver of my rights.

I do not wish for my data to be used in this study. Please delete all responses I have provided. Please note that if you choose this option, and your answers to the scales are validated before being deleted, you will still receive a gift card in compensation for your time.

Appendix J Study 3 Debriefing

What are we trying to learn in this research?

The threat of the H1N1 virus had repercussions for the distress that might be experienced by individuals, depending of their level of concern regarding risk of infection for themselves and those close to them. We are interested in evaluating how the public will react to future health threats, given the previous H1N1 scare; as well as general appraisals and psychological distress that might predict responses to a threat. Deception was used in this study as the news article you read was completely fictional. Most specifically, scientists have not concluded that there will be pandemic next winter. Additionally, all details about the strength of the new virus and the symptoms it would produce were fictionalized based on previous health reports. We used a fictional news article to determine how you would truly respond in the face of a future potential pandemic. While it is possible that a third wave of H1N1 may occur, the articles in this study do not reflect the true chances of this health treat. It was necessary for us to use deception in this study so that we can understand your true feelings regarding the safety of your health in the face of a potential pandemic.

Where can I learn more about H1N1 and other viruses?

World Health Organization	www.who.int/csr/disease/swineflu/en/
Ontario Ministry of Health	www.ontario.ca/flu

What if I have questions later?

Please contact:

Sheena Taha, Graduate Researcher, 613-520-7513, staha@connect.carleton.ca

If you have ethical concerns about the study please contact:

Dr. Monique Sénéchal, Chair of Carleton University Ethics Committee for Psychological Research, 613-520-1155, monique_senechal@carleton.ca

Any other concerns:

Dr. Janet Mantler, Chair of Carleton University Psychology Department, 613-520-2600, ext. 4173 janet_mantler@carleton.ca

Is there anything that I can do if I found this experiment to be emotionally draining?

Thank you very much for your participation in this study. If you have experienced any distress while completing these measures, or would like more information regarding H1N1 please contact one of the following Health Agencies.

Public Health Agency of Canada	www.phac-aspc.gc.ca	1-800-454-8302
Ontario Ministry of Health	www.health.gov.on.ca	1-800-268-1153

Appendix K H1N1 Experience

1. Did you get the flu this winter?
 - No
 - Yes
 - unsure

2. Did you get H1N1 this winter?
 - No
 - Yes
 - unsure

3. Have you had, or do you plan on getting, the regular flu shot this season?
 - Yes
 - No
 - Have not decided

4. Have you had, or do you plan on getting, the H1N1 vaccine?
 - Yes
 - No
 - Have not decided

5. Have you ever had any of the following? *Please check all that apply.*
 - Pneumonia
 - Influenza
 - Malaria
 - Chicken pox
 - Measles
 - Asthma
 - Major depressive disorder
 - Posttraumatic stress disorder
 - Generalized anxiety disorder
 - Cardiovascular illness (of any sort)
 - Immune-related disorder (i.e. arthritis, lupus)
 - Allergies

6. Do you believe that H1N1 was a pandemic?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

7. Do you believe that vaccination prevented H1N1 from becoming something more serious?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

8. Do you believe the Canadian government:

a) overall, dealt with H1N1 effectively?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

b) did a good job informing the public of details relating to H1N1?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

c) dealt with vaccine shortages appropriately?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

d) dealt with line ups for vaccines appropriately?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

If you wish, please provide more details to any of your answers here:

9. Do you believe the media conveyed accurate information regarding H1N1?

Yes, I believe the media reports were true

Yes, but I believe the media reports were a little bit sensationalized

Yes, but I believe the media presented contradictory or confusing information

No, the media reports dramatized H1N1

No, I don't believe anything the media reports

10. Do you believe your doctor conveyed accurate information regarding H1N1?
Yes, but I believe my doctor downplayed the situation
Yes, I believe what my doctor told me to be true
Yes, but I believe my doctor embellished the situation
No, my doctor was too dramatic about H1N1
No, I don't think my doctor was knowledgeable about H1N1
Not applicable
11. Do you think your workplace/school effectively dealt with the H1N1 pandemic?
Yes, I believe my workplace/school was well prepared
Yes, I believe my workplace/school was ready, but overreacting
Yes, but I find that my workplace/school presented contradictory or confusing information
No, my workplace/school did not taken adequate measures
No, my workplace/school had no idea what it was doing
I do not have a workplace, nor attend school

Appendix L Appraisals of Ambiguous Situations

The following is a list of situations that you might encounter at one time or another. Please imagine yourself in each situation, and then indicate how threatening and distressing you would find each of these events. As well, try to imagine how much control you would have over the event happening in the first place, as well as the resolution or outcome of the situation. We will also be asking you to indicate your thoughts concerning each of these situations. Please note that there are no right answers for each question – we are simply looking for your first reaction to each of these situations.

1) There is an outbreak of a new strain of flu and the government is only able to immunize a portion of the population. The criteria for immunization have not been disclosed.

a. How threatening would this situation be for you?

1	2	3	4	5
Not at all				Extremely

b. How distressing would this situation be for you?

1	2	3	4	5
Not at all				Extremely

c. How willing do you think you would be to experience these feelings of threat and/or distress without acting on them (i.e, without trying to manage them, get rid of them, suppress them or run from them etc.)?

1	2	3	4	5
Extremely Willing				Completely Unwilling

d. How much control do you think you would have over this event?

1	2	3	4	5
No control				Complete control

e. How important do you think it would be for you to have control over this event?

1	2	3	4	5
Not important				Very important

f. What would you be most likely to think if this possible outbreak of a new flu strain occurs?

_____	I'm sure that I'm safe – I will be immunized
_____	Though I can't guarantee it, I'm fairly certain I'll be safe
_____	It's too hard to say either way what will happen
_____	Knowing my luck, I probably won't meet the criteria – I might be in danger
_____	I'm positive that I won't be picked – my life is in serious jeopardy

f. What would be most likely to be your first thought?

- _____ He/she goes out with friends all the time – I trust them completely
- _____ It's probably nothing – he/she probably had some friends in town.
- _____ It's strange that they didn't mention it, but maybe they just forgot.
- _____ This is not a good sign...I think he/she is losing interest in me.
- _____ I just knew that they were cheating on me. This relationship is over.

g. How willing do you think you would be to accept this outcome?

- | | | | | | |
|-------------------|---|---|---|------------|-----------|
| 1 | 2 | 3 | 4 | 5 | |
| Extremely Willing | | | | Completely | Unwilling |

8) You were really drunk at a party last Friday night, the events are hazy but you know you've stepped on a few toes/made a fool of yourself and you have to face friends on Monday.

a. How threatening would this situation be for you?

- | | | | | |
|------------|---|---|---|-----------|
| 1 | 2 | 3 | 4 | 5 |
| Not at all | | | | Extremely |

b. How distressing would this situation be for you?

- | | | | | |
|------------|---|---|---|-----------|
| 1 | 2 | 3 | 4 | 5 |
| Not at all | | | | Extremely |

c. How willing do you think you would be to experience these feelings of threat and/or distress without acting on them (i.e, without trying to manage them, get rid of them, suppress them or run from them etc.)?

- | | | | | |
|-------------------|---|---|---|----------------------|
| 1 | 2 | 3 | 4 | 5 |
| Extremely Willing | | | | Completely Unwilling |

d. How much control do you think you would have over this event?

- | | | | | |
|------------|---|---|---|------------------|
| 1 | 2 | 3 | 4 | 5 |
| No control | | | | Complete control |

e. How important do you think it would be for you to have control over this event?

- | | | | | |
|---------------|---|---|---|----------------|
| 1 | 2 | 3 | 4 | 5 |
| Not important | | | | Very important |

f. What would you be most likely to think that would happen?

- _____ My friends are going to think I'm a party animal and fun to hang out with.
- _____ I'm probably going to get made fun of but everyone will probably understand.
- _____ It's hard to say – some people might have been mildly offended, but maybe I'm exaggerating
- _____ I'm pretty sure I've damaged a few friendships – things will definitely be awkward for a while.
- _____ I'm going to be thought of as an idiot and I've definitely ruined a lot of

Not at all A lot

3. How much will you worry about contracting this new virus strain?

1 2 3 4 5

Not at all A lot

4. At what point would you become concerned about contracting this new virus strain?

- When at least one person I know contracts H1N1
- When more than one person I know has contracted H1N1
- When 10% of the Canadian population is infected
- When 25% of the Canadian population is infected
- When 50% of the Canadian population is infected
- When the government declares an epidemic in Canada
- Never
- Other *please specify:* _____

5. How serious do you think the spread of this new virus strain will be in Canada?

- Less than 10% of the population will be infected
- 10% of the Canadian population will be infected
- 25% of the Canadian population will be infected
- 50% of the Canadian population will be infected
- H1N1 will be a severe and deadly epidemic in Canada
- Other *please specify:* _____

6. What are your personal chances of contracting this new virus strain?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

7. What are the chances that you close friend will contract this new virus strain?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

8. What are the chances of someone in the general public contracting the new virus strain?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

9. If you get this new virus strain, how serious do you think the symptoms will be?

- very mild. I could just stay home and catch up on stuff.
- like a normal flu. I would stay in bed for a few days and take care of it.
- serious. Would put me out of commission for at least a week.
- very serious. Would feel extremely ill, and would need to seek medical help.
- extremely serious. Life-threatening.

10. Do you trust the media to convey accurate information regarding this new virus strain?

- Yes, I believe the media reports would be true
- Yes, but I believe it would be a little bit sensationalized
- Yes, but I believe it would presents contradictory or confusing information
- No, the media reports would dramatize H1N1
- No, I don't believe anything the media reports

11. Do you trust your doctor to convey accurate information regarding this new virus strain?

- Yes, but I believe my doctor would be downplaying the situation
- Yes, I believe what my doctor tells me would be true
- Yes, but I believe my doctor would be embellishing the situation
- No, my doctor would be too dramatic about H1N1
- No, I don't think my doctor would be knowledgeable about H1N1

12. Do you trust your workplace/school to effectively deal with this new virus strain?

- Yes, I believe my workplace/school is well prepared
- Yes, I believe my workplace/school is ready, but overreacting
- Yes, but I find that my workplace/school presents contradictory or confusing information
- No, my workplace/school has not taken adequate measures
- No, my workplace/school has no idea what it is doing
- I do not have a workplace, nor attend school

13. If you receive e-mail updates and alerts from your workplace/school regarding this new virus strain, will you?

- Read them thoroughly and bring them to the attention of others
- Read them just to ensure you are informed
- Read some, but not sure what they really have to do with you
- Read some, but mostly find them useless
- Delete them all
- I do not have a workplace, nor attend school

14.. Were there any particular concerns that you have about this new virus strain that you believe have not been addressed? *Please describe.*

Appendix N Study 4 Informed Consent

The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent has to provide sufficient information such that you have the opportunity to determine whether you wish to participate in the study.

Study Title: Perspectives on Health

Study Personnel:

Dr. Kim Matheson (Faculty Investigator, 520-2600 ext. 2684) kim_matheson@carleton.ca

Dr. Hymie Anisman (Faculty Investigator, 520-2600 ext. 2699)

hanisman@ccs.carleton.ca

Sheena Taha (Graduate Researcher, 520-2600 ext. 7513) staha@connect.carleton.ca

If you have any ethical concerns about how this study was conducted please contact:

Dr. Monique Sénéchal, Chair of Carleton University Ethics Committee for Psychological Research, 613-520-1155, monique_senechal@carleton.ca

If you have any other concerns please contact:

Dr. Anne Bowker, anne_bowker@carleton.ca (613-520-2600 ext. 8218).

Purpose and Task Requirements: The purpose of this project is to evaluate your attitudes towards potential health threats, as well as behaviours you may engage in to maintain your health. In order to participate in this study you will answer questions online, which will take approximately 45 minutes. These questionnaires will address your demographic information (i.e., gender, education, religious affiliation, etc.), your medical history, your perception of various health related situations, as well as your emotions and thoughts regarding health threats. You will be compensated according to how much of the survey you complete. After completing the first three questionnaires, you will have earned the equivalent of \$1.00 in a gift card. After completing the first five questionnaires, you will have earned the equivalent of \$2.00. Once you have completed more than half of the survey you will be receive a \$5.00 gift card of your choice to Tim Horton's or Starbucks. **Please note, that in order to receive your gift certificate, your answers must be deemed valid. Individuals who respond randomly to the questions will not receive a gift card.**

Potential Risk and Discomfort: There are no physical risks in this study. You may experience some anxiety when reflecting on issues associated with a potential health threat.

Anonymity/Confidentiality: The data collected in this study will be kept confidential. We take special precautions to make sure that no one will be able to identify you or what your responses were. Your personal information will be stored in a separate file from your questionnaire responses. Only your chosen "id name" will identify your questionnaire.

Right to Withdraw: Your participation in this study is entirely voluntary. At any point during the study you have the right not to complete certain questions or to withdraw from the study. The amount of the gift card you earn will be based on how much you have completed prior to withdrawing from the study.

This study had received clearance by the Carleton University Psychology Research Ethics Board (11-121).

I have read the above description of the study. The data collected will be used in research publications and/or for teaching purposes. My sign-in indicates that I agree to participate in the study, and this in no way constitutes a waiver of my rights.

Appendix O Study 4 Debriefing

What are we trying to learn in this research?

Many researchers have tried to determine what causes individuals' to engage in regular health-promoting behaviours' and prevention of illnesses. We are interested in how you evaluate health threats. Specifically, we would like to determine the influence of certain personality traits on how you view disease, and how these factors relate to the actions you may take to minimize your chances of developing illness. Furthermore, we are interested in comparing responses to a disease that is potentially long-term and affects a great number of people (i.e., cancer) to responses regarding a more short-term and ambiguous threat (i.e., a virus). You responded to this study in regard to your thoughts about a viral threat, and we will compare your responses to those of participants that responded to their thoughts about cancer.

Where can I learn more about health threats?

Public Health Agency of Canada <http://www.phac-aspc.gc.ca/id-mi/index-eng.php>
 Ontario Ministry of Health www.ontario.ca/flu

What if I have questions later?

Please contact:

Sheena Taha, Graduate Researcher, 613-520-7513, staha@connect.carleton.ca

If you have ethical concerns about the study please contact:

Dr. Monique Sénéchal, Chair of Carleton University Ethics Committee for Psychological Research, 613-520-1155, monique_senechal@carleton.ca

Any other concerns:

Dr. Anne Bowker, Chair of Carleton University Psychology Department, (613-520-2600 ext. 8218), anne_bowker@carleton.ca

Is there anything that I can do if I found this experiment to be emotionally draining?

Thank you very much for your participation in this study. If you have experienced any distress while completing these measures, or would like more information regarding health and illness please contact one of the following Health Agencies.

Public Health Agency of Canada	www.phac-aspc.gc.ca	1-800-454-8302
Ontario Ministry of Health	www.health.gov.on.ca	1-800-268-1153

This study had received clearance by the Carleton University Psychology Research Ethics Board (11-121).

Appendix P Demographics and Medical History

1. What is your current age? _____
2. What is your sex?
 - Male
 - Female
3. What is your ethnic/racial identity?
 - Asian (i.e. Chinese, Japanese, Korean)
 - South Asian (i.e. East Indian, Pakistani, Punjabi, Sri Lankan)
 - South East Asian (i.e. Cambodian, Indonesian, Laotian)
 - Arabic
 - Black
 - South/Latin American
 - Aboriginal
 - Euro-Caucasian
 - Other *please specify:* _____
4. What is your religious affiliation?
 - Protestant
 - Catholic
 - Jewish
 - Muslim
 - Buddhist
 - Hindu
 - Sikh
 - Baha'i
 - Atheist
 - Agnostic
 - Other *please specify:* _____
5. What is your current relationship status? *Please check the one that best applies to you.*
 - Single
 - In a serious dating relationship
 - Co-Habiting
 - Engaged
 - Married
 - Separated/Divorced
 - Widowed
6. What is your current living arrangement? *Please check the one that best applies to you.*
 - Living alone

- Living with friends
- Living with spouse/significant other
- Living with spouse/significant other and children
- Living with young children (13 years and younger)
- Living with older children (14 years and older)
- Living with parents
- Other *please specify* _____

7. How would you define the population of the area you *live* in?

- Large city: 1 million people or more
- Medium city: 100,000 - 999,999 people
- Small city: 10,000 – 99,999 people
- Rural area: less than 9,999 people
- Other *please specify*: _____

8. How would you define the population of the area you *work or attend school* in?

- Large city: 1 million people or more
- Medium city: 100,000 - 999,999 people
- Small city: 10,000 – 99,999 people
- Rural area: less than 9,999 people
- I do not work, nor attend school
- Other *please specify*: _____

9. What is your citizenship status?

- Canadian citizen
- Landed immigrant Since when? _____ Country of origin? _____
- Student visa Since when? _____ Country of origin? _____
- Other *please specify*: _____

10. What is your first language? _____

11. What is the highest level of education that you have completed?

- Grade school
- Some high school
- High school diploma
- Trade certificate/diploma
- Some college
- College diploma/degree
- Some university
- University degree

12. Are you currently a student?

- No
- Yes

13. Are you currently employed?
 Yes, full time *please specify your occupation:* _____
 Yes, part time *please specify your occupation:* _____
 Retired *please specify your previous occupation:* _____
 Not employed at all
14. What is your estimate of your family's gross income per year?
 under \$15,000
 \$15,001 - \$29,999
 \$30,000 - \$44,999
 \$45,000 - \$59,999
 \$60,000 - \$74,999
 \$75,000 - \$89,999
 \$90,000 - \$104,999
 \$105,000 or more
15. Do you have any visible physical disability?
 No
 Yes *please specify:* _____
16. Are you currently dealing with and/or being treated for any illness or physical condition?
 No
 Yes *please specify:* _____
17. How often do you go for checkups with your family physician?
 Never
 Once every 6 months
 Once a year
 Once every two years
 I only go to the doctor when something is wrong
18. How often do you go for checkups with your dentist?
 Never
 Once every 6 months
 Once every nine months
 Once a year
 Once every two years
 I only go to the dentist when something is wrong
19. Did you get the flu last winter?
 No
 Yes
 unsure

20. Did you get H1N1 during the swine flu pandemic?

No

Yes, diagnosed by medical system

Yes, I believe I had H1N1, though I was never officially tested

Unsure

21. Did you get the H1N1 vaccination?

Yes

No

22. Did someone you know get H1N1 during the swine flu pandemic?

No

Yes, diagnosed by medical system

Yes, they believe they had H1N1, though they were never officially tested

Unsure

If you answer yes, please tell us who this person was (e.g., sister, child, friend, etc.) _____

23. Have you had, or do you plan on getting, the regular flu shot this season?

No										Unsure										Yes
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%										

24. Have you ever had any of the following? *Please check all that apply.*

Pneumonia

Influenza

Malaria

Chicken pox

Measles

Asthma

Major depressive disorder

Posttraumatic stress disorder

Generalized anxiety disorder

Cardiovascular illness (of any sort)

Immune-related disorder (i.e. arthritis, lupus)

Allergies

25. Do you have a family member that is/was diagnosed with cancer?

No

Yes

If yes, what is their relationship to you? _____

If yes, what type of cancer did they have? _____

If yes, what was the outcome of their cancer experience? _____

26. Do you believe the Canadian government:

b) dealt with H1N1 effectively?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

b) did a good job informing the public of details relating to H1N1?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

c) dealt with vaccine shortages appropriately?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

d) dealt with line-ups for vaccines appropriately?

0	1	2	3	4
Not at all	Not really	Unsure	Somewhat	Yes, definitely

27. Do you believe the media conveyed accurate information regarding H1N1?

- Yes, I believe the media reports were true
- Yes, but I believe the media reports were a little bit sensationalized
- Yes, but I believe the media presented contradictory or confusing information
- No, the media reports dramatized H1N1
- No, I don't believe anything the media reports

28. Do you believe your doctor conveyed accurate information regarding H1N1?

- Yes, but I believe my doctor downplayed the situation
- Yes, I believe what my doctor told me to be true
- Yes, but I believe my doctor embellished the situation
- No, my doctor was too dramatic about H1N1
- No, I don't think my doctor was knowledgeable about H1N1
- Not applicable

Appendix Q Health Assessment

Look at the following list. Now think about the past year and indicate how often you learned something about diseases or how to prevent them (i.e., AIDS, cancer, diabetes, flu, asthma, injuries, etc.) from this source.

a)TV

Never	Seldom	Sometimes	Often	Almost always
0	1	2	3	4

b)radio

Never	Seldom	Sometimes	Often	Almost always
0	1	2	3	4

c)newspapers or magazines

Never	Seldom	Sometimes	Often	Almost always
0	1	2	3	4

d)hotlines

Never	Seldom	Sometimes	Often	Almost always
0	1	2	3	4

e)Internet

Never	Seldom	Sometimes	Often	Almost always
0	1	2	3	4

f)family or friends

Never	Seldom	Sometimes	Often	Almost always
0	1	2	3	4

Please indicate how much you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
<u>Health Consciousness:</u>					
1. Living life in the best possible health is very important to me.	1	2	3	4	5
2. Eating right, exercising, and taking preventative measure will keep me healthy for life.	1	2	3	4	5
3. My health depends on how well I take care of myself.	1	2	3	4	5
4. I actively try to prevent disease and illness.	1	2	3	4	5
5. I do everything I can to stay healthy.	1	2	3	4	5
<u>Health Information Orientation</u>					
6. I make a point to read and	1	2	3	4	5

	watch stories about my health.					
7.	I really enjoy learning about health issues.	1	2	3	4	5
8.	To be and stay health, it's critical to be informed about health issues.	1	2	3	4	5
9.	The amount of health information available today makes it easier for me to take care of my health.	1	2	3	4	5
10	When I take medicine I try to get as much information as possible about its benefits and side effects.	1	2	3	4	5
11	I need to know about health issues so I can keep myself and my family healthy.	1	2	3	4	5
12	Before making a decision about my health, I find out everything I can about this issue.	1	2	3	4	5
13	It's important to me to be informed about health issues.	1	2	3	4	5

Please indicate how often you are performing each of the following behaviours to maintain your health.

Healthy Activites

14.	Eating a diet that is low in fat.				
	Never	Seldom	Sometimes	Often	Almost always
	0	1	2	3	4
15.	Eating lots of fruits, vegetables and grains.				
	Never	Seldom	Sometimes	Often	Almost always
	0	1	2	3	4
16.	Drinking plenty of water every day.				
	Never	Seldom	Sometimes	Often	Almost always
	0	1	2	3	4
17.	Taking vitamins and mineral supplements regularly.				

- | | | | | | |
|--|-------|--------|-----------|-------|---------------|
| | Never | Seldom | Sometimes | Often | Almost always |
| | 0 | 1 | 2 | 3 | 4 |
18. Exercising regularly.
- | | | | | | |
|--|-------|--------|-----------|-------|---------------|
| | Never | Seldom | Sometimes | Often | Almost always |
| | 0 | 1 | 2 | 3 | 4 |
19. Not smoking cigarettes.
- | | | | | | |
|--|-------|--------|-----------|-------|---------------|
| | Never | Seldom | Sometimes | Often | Almost always |
| | 0 | 1 | 2 | 3 | 4 |
20. Not drinking alcohol or drinking in moderation.
- | | | | | | |
|--|-------|--------|-----------|-------|---------------|
| | Never | Seldom | Sometimes | Often | Almost always |
| | 0 | 1 | 2 | 3 | 4 |
21. Maintaining a healthy body weight.
- | | | | | | |
|--|-------|--------|-----------|-------|---------------|
| | Never | Seldom | Sometimes | Often | Almost always |
| | 0 | 1 | 2 | 3 | 4 |

Appendix R Condition Specific Context

The viral condition received the following passage:

The World Health Organization has been closely monitoring the evolution of the H5N1 Avian flu virus (World Health Organization – Global Alert and Response, August 15, 2011). As this viral strain infects more people each year, and mutations to increase human-to-human transmission are possible, virologists believe that H5N1 could lead to another pandemic (Webster & Govorkova, 2006). Please answer the following questionnaires in regard to your thoughts and feelings about the H5N1 Avian flu virus.

The cancer condition received the following passage:

The Canadian Cancer Society states that breast cancer is the most common type of cancer among women. One in nine women will be diagnosed with breast cancer in their lifetime, and one in 29 will die of it. Among men, prostate cancer is the most common type of cancer diagnosed. One in seven men will be diagnosed with prostate cancer in their lifetime, and one in 29 will die of it.

Appendix S Illness Perception Questionnaire

We want to know your personal views about the H5N1 virus/cancer. Please indicate whether you agree or disagree with the following statements. There are no right or wrong answers.

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
<u>Timeline-chronic</u>					
18	1	2	3	4	5
	This illness will last a short time				
19	1	2	3	4	5
	The illness will last for a long time				
20	1	2	3	4	5
	This illness will pass quickly				
21	1	2	3	4	5
	I expect this illness to last for the rest of one's life				
22	1	2	3	4	5
	The illness is likely to be permanent rather than temporary				
<u>Timeline-cyclical</u>					
23	1	2	3	4	5
	The illness is very unpredictable				
24	1	2	3	4	5
	The symptoms come and go in cycles				
25	1	2	3	4	5
	This illness goes through cycles in which it gets better or worse				
<u>Consequences</u>					
26	1	2	3	4	5
	This illness has serious financial consequences				
27	1	2	3	4	5
	This illness causes difficulties to those close to the patient				
28	1	2	3	4	5
	This illness is very serious				
<u>Control-personal</u>					
29	1	2	3	4	5
	The course of this illness depends on the patient				
30	1	2	3	4	5
	The patient has the power to influence this illness				
31	1	2	3	4	5
	What the patient does can determine whether this illness gets better or worse				
<u>Control-treatment</u>					
32	1	2	3	4	5
	The negative effects of this illness can be prevented				

	(avoided) by treatment					
33	The treatment can control this illness	1	2	3	4	5
34	The treatment will be effective in curing this illness	1	2	3	4	5
	<u>Illness coherence</u>					
35	This illness is a mystery to me	1	2	3	4	5
36	I don't understand this illness	1	2	3	4	5
37	The symptoms of this illness are puzzling to me	1	2	3	4	5
	<u>Emotional representations</u>					
38	When I think about this illness I get upset	1	2	3	4	5
39	I get depressed when I think about this illness	1	2	3	4	5
40	This illness makes me feel afraid	1	2	3	4	5
41	Thinking about having this illness makes me feel anxious	1	2	3	4	5
42	This illness makes me feel angry	1	2	3	4	5

Please indicate whether you agree or disagree with the following causes of the H5N1 virus/cancer. There are no right or wrong answers.

		Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
	<u>Causes-psychological</u>					
43	Family problems or worries	1	2	3	4	5
44	Personal attitude (e.g., thinking about life negatively)	1	2	3	4	5
45	Personality	1	2	3	4	5
46	Emotional state (e.g., feeling down, lonely, anxious, empty)	1	2	3	4	5
47	Overwork	1	2	3	4	5
48	Stress or worry	1	2	3	4	5
	<u>Causes-risk factors</u>					
49	Diet or eating habits	1	2	3	4	5
50	Overweight	1	2	3	4	5
51	Poor medical care	1	2	3	4	5
52	Ageing	1	2	3	4	5
53	Heredity	1	2	3	4	5
54	Smoking	1	2	3	4	5
55	Alcohol	1	2	3	4	5

	<u>Causes-immunity</u>					
56	Pollution	1	2	3	4	5
57	Immunity	1	2	3	4	5
58	A germ or virus	1	2	3	4	5
	<u>Causes-chance</u>					
59	Chance or bad luck	1	2	3	4	5

Appendix T Illness Behaviours

The following questions were presented to both groups.

1. How threatened do you feel by your chances of contracting 'the H5N1 virus/cancer'?

1	2	3	4	5
Not at all				A lot

2. How much control do you feel over whether or not you will contract 'the H5N1 virus/cancer'?

1	2	3	4	5
Not at all				A lot

3. How much do you worry about contracting 'the H5N1 virus/cancer'?

1	2	3	4	5
Not at all				A lot

4. What are your personal chances of developing 'the H5N1 virus/cancer'?

Definitely will NOT develop					Unsure					Definitely will develop
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

5. What are the chances that your close friend will develop 'the H5N1 virus/cancer'?

Definitely will NOT develop					Unsure					Definitely will develop
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

6. What are the chances that someone in the general public will develop 'the H5N1 virus/cancer'?

Definitely will NOT develop					Unsure					Definitely will develop
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

7. Do you trust the media to convey accurate information regarding 'the H5N1 virus/cancer'?

Yes, I believe the media reports would be true
 Yes, but I believe it would be a little bit sensationalized
 Yes, but I believe it would presents contradictory or confusing information
 No, the media reports would dramatize 'the H5N1 virus/cancer'

No, I don't believe anything the media reports

8. Do you trust your doctor to convey accurate information regarding 'the H5N1 virus/cancer'?

Yes, but I believe my doctor would be downplaying the situation

Yes, I believe what my doctor tells me would be true

Yes, but I believe my doctor would be embellishing the situation

No, my doctor would be too dramatic about 'the H5N1 virus/cancer'

No, I don't think my doctor would be knowledgeable about 'the H5N1 virus/cancer'

9. Were there any particular concerns that you have about this illness that you believe have not been addressed? *Please describe.*

The following questions were presented to participants in the cancer condition only:

Have you ever been screened for breast/prostate cancer?

Yes, I asked to be screened

Yes, my doctor recommended I be screened

No, I do not want to be screened

No, my doctor has not yet recommended I be screened

Other *please specify:* _____

Do you intend to be screened for breast/prostate cancer in the future?

No						Unsure						Yes
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		

The following questions were presented to participants in the viral condition only:

Do you intend to receive vaccination for the H5N1 virus in the future?

No						Unsure					Yes
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	

At what point would you become concerned about contracting this new H5N1 virus strain?

When at least one person I know contracts the virus

When more than one person I know has contracted the virus

When 10% of the Canadian population is infected

When 25% of the Canadian population is infected

When 50% of the Canadian population is infected

When the government declares an epidemic in Canada

Never

Other *please specify*: _____

If you get this new H5N1 virus strain, how serious do you think the symptoms will be?

very mild. I could just stay home and catch up on stuff.

like a normal flu. I would stay in bed for a few days and take care of it.

serious. Would put me out of commission for at least a week.

very serious. Would feel extremely ill, and would need to seek medical help.

extremely serious. Life-threatening.