FACTORS ASSOCIATED WITH HEALTH CARE PERSONNEL INTENTIONS TO RESPOND TO A PUBLIC HEALTH EVENT

A DISSERTATION

SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL

OF THE UNIVERSITY OF MINNESOTA

BY

SUSAN CONNOR

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

LAURA J. DUCKETT, ADVISOR

MAY 2013

Acknowledgements

I would like to express my great appreciation to Dr. Duckett for her valuable and constructive suggestions during the planning and development of this research work. Her willingness to give her time so generously was very much appreciated. I am also extremely thankful for the patient guidance, enthusiastic encouragement and useful critiques by members of my committee: Dr. Henly, Dr. Olson, and Dr. Garcia.

I am thankful for the support I received from the Violet A. Shea Nursing Scholarship, the University of Minnesota Simulations and Exercises for Educational Effectiveness (U-SEEE), which is supported in part through a grant from the Centers for Disease Control and Prevention (CDC/COPTER Grant Number 5P01TP000301-02), and the GI Bill. The contents of this dissertation are the sole responsibility of the author and do not represent the official views of the CDC or the U.S. Government.

I would also like to acknowledge those who took the time and effort to participate in this research.

Dedication

To my

Parents

Husband

and

Friends

For giving me courage and inspiration

Abstract

Background. Health care personnel (HCP) are an important link in emergency response. Yet, researchers have reported that not all HCP intend to respond when a public health event (PHE) occurs. Ajzen's theory of planned behavior (TPB) was the theoretical framework for this study.

Objective. The objective of this study was to explore factors associated with HCP intentions to respond to a future PHE.

Method. The TPB was used to develop the PHE Survey that was distributed via the web to six participating facilities located throughout the United States; 305 HCP completed the survey. The dependent variable was intention to respond to a future PHE. The independent variables were three types of beliefs, attitude, subjective norm, and perceived behavioral control. After outliers were removed, the final analytic sample included 303 HCP. To explore the direct and indirect relationships among the observed variables, I used descriptive statistics, Pearson correlations, bivariate analyses, and structural equation modeling. Further analyses were completed to investigate whether the relationships in the final structural model were moderated by professional affiliation in two subgroups, nurses and other HCP.

Results. The item responses and patterns of relationships identified in the final structural equation model implied that the intention to respond was influenced primarily by normative and control factors. The relationship between referent beliefs and subjective norm, and the link between control beliefs and perceived behavioral control were significant. Attitude did not contribute significantly to the prediction of PHE response. The intention of nurses to respond was influenced most by the

control factors whereas other HCP's intention was shaped more by the normative factors.

Discussion. HCP believed they had valuable skills and abilities that they could use to provide tangible help to those affected by a PHE. They also believed that their interpersonal, team membership and leadership skills could help them garner support from their colleagues and collaborate with organizations capable of providing the resources needed to bring about a positive outcome. The combination of these factors bolstered the intent of HCP to respond to a future PHE.

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Chapter I: The Research Problem

Background

Today, an unprecedented number of public health events (PHEs) such as tornados, epidemic outbreaks, and acts of terrorism are occurring around the world. Over the past 30 years, there has been a four-fold increase in the number of reported PHEs (Guha-Sapir, Hargitt, & Hoyois, 2004; Gutierrez, 2008). After analyzing data from the Red Cross, United Nations, and Louvain University in Belgium, the British charity Oxfam observed the planet is experiencing approximately 500 natural disasters annually, compared with 120 reported each year in the early 1980s (Gutierrez, 2008).

Evidence indicates that global climate change appeared to contribute to the increase in the number and severity of natural disasters (Miller, 2012). Additionally, changing political climates along with shifts in populations are expected to increase the number of people who are vulnerable to PHEs (Guha-Sapir et al., 2004).

Following the terrorist attacks on September 11, 2001, the United States (U.S.) government invested considerably in programs to expand and improve key PHE response systems. Despite improvements in public health systems and preparedness, many challenges remain including improvements in the capacity and capability of the health-care system across the U.S. to absorb a large-scale surge of persons injured or in poor health resulting from a PHE (Rand, 2011).

Given the current fiscal pressures and staffing issues, finding and coordinating the health care resources needed to provide appropriate physical, psychological, and ethical care during a PHE is difficult. Evidence of strained health care systems are

reported by the media and government agencies as shelters and hospitals near shelters fill with medically fragile citizens during PHEs.

When powerful winter storms hit California in 1997, over 150,000 people evacuated to nearby shelters. The California Public Health Department recorded that nearly 1,000 of these evacuees were medically fragile individuals from nursing homes, board and care facilities, and home health care settings. As this disaster unfolded, shelter populations grew and available health care resources became overwhelmed (Alameda County Operational Area Emergency Management Organization, 2004). Eight years later, Hurricane Katrina forced an estimated 125,000 citizens to flee New Orleans. Over 47,000 people evacuated to Georgia shelters. Hospitals located near these shelters reported a seven-fold increase in visits from evacuees needing medical support for a variety of chronic diseases such as diabetes and hypertension (Cookson et al., 2008).

Health care personnel (HCP) are an important link in the emergency response chain and are on the front line when a PHE occurs. Yet, researchers worldwide have reported that just 25% to 80% of HCP intend to respond during a PHE; some HCP even consider job exit or early retirement rather than responding to a PHE (Chaffee, 2009; Gershon et al., 2010; Shapira et al., 1991; Smith, 2007; T.Y. Wong et al., 2008). Of those who reported a willingness to respond, 15% to 20% indicated they were not willing to work any additional shifts (Gershon et al., 2010; Qureshi et al., 2005).

Sufficient staffing of health care facilities during PHEs is necessary to support the health care needs of the community. Staffing challenges are just one of the burdens encountered by health care systems as PHEs have the potential to transform

a resource-rich health care environment to one of austerity fraught with practical and ethical dilemmas beyond just integrating principles of public health and safety with triage, patient surge, and the allocation of scarce resources.

Research exploring PHE response by HCP is undeveloped. Few investigators have examined the processes that link HCP's beliefs and perceptions to intentions to respond to PHEs.

Statement of Purpose

The purpose of this research was to explore factors associated with HCP's intentions to respond to a future PHE. The theory of planned behavior (TPB), the theoretical framework, guided the development of the web-based PHE survey instrument. Data were collected in 2010 from a convenience sample of 305 HCP who worked in the U.S. (see Appendix A, B and C). Three aims guided this study.

Specific Aims

1. Evaluate responses to the PHE survey, including psychometric properties of the TPB-based scales.
2. Compare PHE survey responses of nurses with those of other health care personnel.
3. Estimate a series of TPB-based observed variable structural equation models for prediction of intent to respond to a future PHE, including exploration of mediating and possible moderating influences.

Significance for Nursing

The deleterious effects of PHEs are most poignantly seen in the medically vulnerable (e.g., elderly, disabled, pregnant women, infants, and dialysis patients) who rely on a robust community health care system to maintain their well-being. Yet without adequate numbers of HCP willing to work during a PHE, the health of the community is in jeopardy.

An understanding of the contributing factors associated with the willingness of HCP to work or not to during a PHE could be used to inform emergency response planners, staffing coordinators, health educators, and health care personnel about the variables associated with the intentions of HCP to respond to PHEs.

Chapter II: Review of the Literature

Research examining the willingness of HCP to work when PHEs occur is still evolving and gaps remain in understanding what influences the intentions of HCP to respond to PHEs. A central component of a scientific agenda aimed at addressing these gaps is the identification of factors that guide HCP's PHE response.

Review of Related Literature

The seminal study by Shapira et al. (1991) did not seem to generate much interest until 2002 when the numbers of patient care concerns increased as a result of HCP reluctance to work during PHEs (French, Sole, & Byers, 2002; Lanzilotti, Galanis, Leoni, & Craig, 2002). Current evidence suggests that four primary factors either facilitate or hinder HCP's intention to respond to a PHE: the nature of the PHE; competing obligations; organizational role and climate; and the relationships between knowledge and perceptions of efficacy (see Figure 2.1).

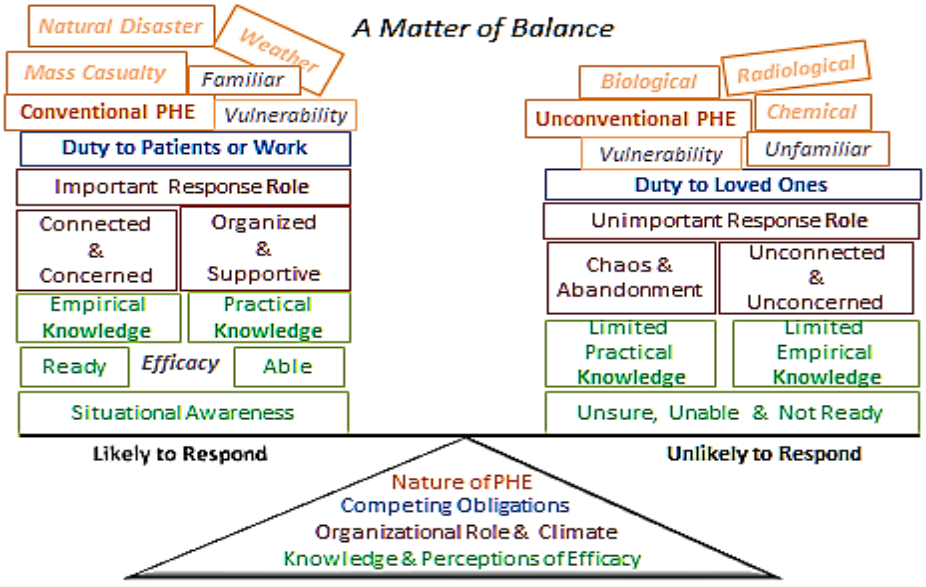


Figure 2.1. Balancing the factors that either facilitate or hinder HCP's intention to respond to a PHE.

Nature of the PHE. PHEs are events that can occur quickly, such as a tornado, or linger, such as the H1N1 pandemic. Some PHEs are common, such as severe weather events. Others, such as terrorist attacks involving biological agents, are infrequent. The nature of a PHE appears to influence HCP's responses. In general, human-made events and pandemic outbreaks seem to be the most unfamiliar and fear inducing, thus creating the perceptions of being large in scale, long in duration, and complex in terms or the range of hazards (Smith, Burkle, & Archer, 2011; Smith, Morgans, Qureshi, Burkle, & Archer, 2009).

Several groups of researchers noted that just 45% to 58% of participating HCP indicated a willingness to respond during a human-made event such as a terrorist attack (Cone & Cummings, 2006; Dimaggio, Markenson, & Redlener, 2005; Lanzilotti et al., 2002; Masterson, Steffen, Brin, Kordick, & Christos, 2009). In similar investigations, merely 25% to 82% of the participants indicated they were willing to work during a pandemic (Alexander & Wynia, 2003; Balicer et al., 2010; Basta, Edwards, & Schulte, 2009; Dimaggio et al., 2005; Gershon et al., 2010; Irvin, Cindrich, Patterson, & Slouthall, 2008; Ma et al., 2011; Masterson et al., 2009; Qureshi et al., 2005; E. L. Wong et al., 2010). However for a mass casualty incident, 83% to 90% of study participants implied they were willing to respond to such events as an airplane crash or tornado (Cone & Cummings, 2006; Lanzilotti et al., 2002; Masterson et al., 2009; Qureshi et al., 2005).

The perception of vulnerability also seemed to be an important factor in PHE response. As perceived risks increased, the intention to respond dropped (Alexander

& Wynia, 2003; Balicer et al., 2010; Barnett et al., 2009; Basta et al., 2009; Cowan, Ching, Clark, & Kemper, 2005; Dimaggio et al., 2005; O'Boyle, Robertson, & Secor-Turner, 2006; Smith et al., 2011; Tam, Lee, & Lee, 2007). Indeed when the severe acute respiratory syndrome (SARS) and H1N1 pandemics occurred in Asia, four different groups of researchers described that HCP believed their stress was due to three perceptions: (a) lack of control over becoming infected, (b) inexperience with treatments, and (c) colleagues who, through contact with patients, developed and succumbed to the infection (Chong et al., 2004; Koh et al., 2005; Tzeng & Yin, 2008; E. L. Wong et al., 2010).

Competing obligations. Researchers suggested beliefs regarding personal and professional obligations are in conflict during a PHE and seemed to influence HCP's willingness to work during a PHE. The tension between personal and professional commitments and loyalties among emergency responders emerged as a hierarchy of concerns. Emergency personnel often described difficulty in finding a balance between their need to be safe and their duty to care owing to conflicting thoughts about job responsibilities and possible injury or death (Bensimon, Tracy, Bernstein, Shaul, & Upshur, 2007; Davidson et al., 2009; Mitani, Kuboyama, & Shirakawa, 2003; Smith, 2008; Smith et al., 2009).

Concern for the well-being of family and loved ones, including pets, led the list of limiting factors several groups of researchers reported to influence HCP's intentions not to respond to terrorist events involving biological, chemical or nuclear substances (Barnett et al., 2010; Basta et al., 2009; Chong et al., 2004; Damery et al., 2010; DeSimone, 2009; Dimaggio et al., 2005; French et al., 2002; Garrett, Park, & Redlener,

2009; Gershon et al., 2010; Grimes & Mendias, 2010; Imai et al., 2010; Ma et al., 2011; Mackler, Wilkerson, & Cinti, 2007; Martin, 2011; Masterson et al., 2009; Qureshi et al., 2005; Scott, Bansal, & Mascarenhas, 2008; Shaw, Chilcott, Hansen, & Winzenberg, 2006; Tippett et al., 2010; Tzeng & Yin, 2008).

A belief that caring for patients is a moral imperative emerged as the most persuasive factor among physicians and emergency department employees when asked why they intended to respond during a PHE. This imperative was expressed as a sense of duty to the patient, altruism, and the perception they were able to provide tangible help (Ives et al., 2009; Masterson et al., 2009; Qureshi, Gershon, & Conde, 2008; Shaw et al., 2006). "Despite the fear of becoming contagious, we were truly willing to help the patients with SARS because we were the only persons on whom they could call for help. We could not give up on them" (Chiang, Chen, & Sue, 2007, p. 22).

Balancing personal and professional obligation is dynamic and dependent on the perceived risks associated with the PHE. Following the 2001 terrorist attacks in New York City a paramedic reflected,

> Would I respond again, you bet, it's my job. If it was some sort of bioterrorist event, or nuclear thing for example, yeah I would have to think twice about going, my wife wouldn't want me to, that's for sure. (Smith, 2008, pp. 7-8)

These conflicting beliefs are evident worldwide. In the United Kingdom, a group of researchers reported that 73% of HCP surveyed agreed, "all [health care workers] HCWs have a duty to work, even if there are high risks involved." However 74% of the same group of participants also agreed, "my main responsibility is to myself and my

family" (Damery et al., 2010, p. 16). Similarly, in Japan this conflict seemed to increase hesitation of HCP to respond. Over half of the HCP participating in a study expressed strong fears of being infected or infecting family members, yet they believed they had no choice except to work due to obligation (Imai et al., 2010). As recorded during a telephone interview, a Canadian physician reflected on his experience following the SARS pandemic.

> SARS has made everybody think about would I participate in a high-risk procedure with a SARS patient? And I think most of us have come to the conclusion that yes we would as long as we were well informed about what the risk was and as long as we were provided with the appropriate protection. . . . But I'm sure everybody has thought about where the line is now that they would draw. (Straus et al., 2004, p. 2)

Organizational role and climate. "If the workforce is not informed of the realistic risk and associated plans to be enacted to minimize exposure, they may not report to work" (Irvin et al., 2008, p.333). Confidence in the employer's capacity to respond appropriately to employee concerns regarding safety significantly increased employee willingness to respond (Garrett et al., 2009; Gershon et al., 2010; Grimes & Mendias, 2010; Ives et al., 2009; O'Boyle et al., 2006; Smith et al., 2009; Tippett et al., 2010). Additionally, HCP with a specific role in an organization's emergency response plans were reported to be three to five times more willing to respond than those who did not have a PHE response role (Balicer et al., 2010; Barnett et al., 2009; Chokshi, Behar, Nager, Dorey, & Upperman, 2008; Goodhue et al., 2011; Griffiths, Emrys, Finney Lamb, Eagar, & Smith, 2003; Gullion, 2004). However if HCP perceived a lack

of support from their organization or did not fill an important role in the response plans, their intention to respond to the PHE waned (Balicer et al., 2010; O'Boyle et al., 2006; Tolomiczenko et al., 2005).

Knowledge and perceptions of efficacy. Even though several authors called for more education as a means of enhancing HCP's response to PHEs, education alone did not seem to bolster the willingness of HCP to respond to a PHE (Basta et al., 2009; Grimes & Mendias, 2010; Katz et al., 2006a, 2006b; Tippett et al., 2010).

Although PHE-specific education did decrease concerns about working with infected patients and was correlated with the intention to respond, other factors such as years of practice, level of education, knowledge of individual response roles, previous experience, hospital support, and a sense of self-efficacy appeared to also significantly contribute to the willingness of HCP to respond to PHEs (Barnett et al., 2009; Goodhue et al., 2011; Gullion, 2004; Ko et al., 2004; Ma et al., 2011; Tippett et al., 2010; Watt et al., 2010; E. L. Wong et al., 2010). Indeed several peripheral factors seemed to modify the perceptions of response efficacy: HCP who were most knowledgeable and able (e.g., knowledgeable about the disease, able to recognize symptoms, and treat appropriately) were twice as likely to respond to a PHE than those who lacked the knowledge and resources needed to care for the patient (Lanzilotti et al., 2002).

Theoretical Framework: Theory of Planned Behavior

The TPB (Ajzen, 1985, 1991, 2011; Ajzen & Manstead, 2007) is well suited to use as a framework for examining relationships between TPB-based predictor variables and behavioral intention and actual behavior. A central factor in the TPB is

the person's intention to perform a given behavior. Although a perfect relationship between intention and the actual behavior does not exist, intention is considered a strong predictor of the target behavior (e.g., working during a pandemic).

According to the TPB, the direct predictors of intention to perform the target behavior are attitude, subjective norm, and perceived behavioral control, which can be measured using behavior specific scaled survey items. There are also three types of indirect predictors of intention: outcome beliefs, referent beliefs, and control beliefs. The relationship of each of the indirect predictors on intention is posited to be mediated by the corresponding direct predictor (see Figure 2.2).

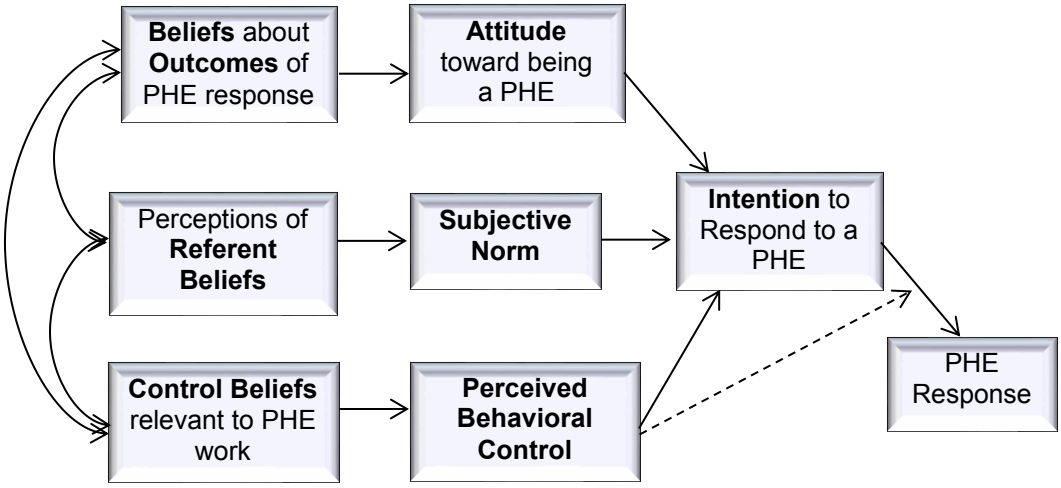


Figure 2.2. The conceptual model for PHE response intention was based on the theory of planned behavior. According to the theory, intention is the immediate antecedent of behavior. Intention is influenced by attitude toward the behavior, subjective norm, and perceived behavioral control. These direct predictors are themselves a function of the underlying behavioral outcome, normative, and control beliefs respectively (Ajzen, 1985, 2013d). The curved double arrow lines are correlations. The solid arrow lines show the predicted paths between observed constructs. A possible path between perceived behavioral control and PHE response is indicated by the dashed arrow.

- Behavior beliefs, a person's beliefs about the outcomes of performing the behavior, underlie a favorable or unfavorable attitude toward the behavior.
- Referent beliefs, a person's perceptions of the expectations of significant others concerning whether he or she should perform the target behavior, underlie a general impression of social pressure to perform the target behavior, which is called subjective norm.
- Control beliefs, a person's perceptions of his or her skills, knowledge, supplies, or available time, predict an overall perception of control.

Though the TPB is based on cognitive processing, Ajzen and colleagues (Ajzen, 2011; Ajzen & Fishbein, 2005) did not completely overlook emotional variables such as fear. These emotional variables were assessed indirectly by measuring the factors associated with an individual's behavioral, normative and control beliefs. Emotions that are salient in a given situation can influence beliefs, which in turn have an effect on intentions and behavior.

Two groups of researchers tested the TPB in the context of a biological PHE (Grimes & Mendias, 2010; Ko et al., 2004). They reported that the theoretical concepts in the model contributed significantly to the explanation of health care workers volunteering to care for infected patients. All the concepts were supported with perceived behavioral control exerting more influence than attitude and subjective norm.

Definition of Terms

Health care personnel. HCP refers to all paid and unpaid persons (e.g., physicians, nurses, pharmacists, dentists, veterinarians, and support staff) working in settings where health care is provided (e.g., hospitals, skilled nursing facilities, physician's offices, outpatient clinics, homes, and schools) who have the potential for exposure to injured or ill persons during a PHE (U.S. Department of Health and Human Services, 2008).

Public health event. A PHE is an uncommon event having the potential to overwhelm community health infrastructure. A PHE includes, however is not limited to, occurrences of severe weather, natural disaster, epidemics or pandemics, and/or terrorist activities that affect the health of a community (Federal Emergency Management [FEMA], 2011; University of Pittsburg, 2011). If assistance from other outside agencies is necessary to support the community, a public health emergency is declared.

PHE response. PHE response is the target behavior. According to the TPB, a particular behavior is likely to occur when a person possesses a positive set of attitudes toward the behavior, the perception of social pressures encouraging the behavior, and perceived control that combine and bolster intention (Ajzen, 1985, 1987).

Intention. Intention is believed to be the antecedent of the target behavior. It reflects the person's attitude toward the behavior, subjective norm, and perceived behavioral control and indicates his or her willingness or reluctance to perform the target behavior (Ajzen, 1985, 2013d).

Beliefs about outcomes. Outcome beliefs tie a behavior, such as responding to a PHE, to the personal perspective of the probable outcome(s) of behavior. This subjective evaluation of the consequences of a behavior contributes to the person's overall attitude regarding his or her actions (Ajzen, 1985, 2013d).

Attitude. Attitude refers to the positive or negative value placed on performing the target behavior and was measured directly by the PHE Survey (Ajzen, 1985, 2013a, 2013d).

Referent beliefs. Referent beliefs are a person's subjective evaluation of how significant individuals or groups who make up his or her social circle expect him or her to act with respect to the target behavior (Ajzen, 1985, 2013d).

Subjective norm. Subjective norm is a person's perception of overall social pressure to perform or not perform a target behavior (Ajzen, 1985, 2013b).

Control beliefs. Control beliefs are the subjective evaluation of internal (e.g., knowledge and skills) and external (e.g., supplies) factors that could help or hinder a person's performance should he or she respond to a PHE. These beliefs along with the individual's perception of the amount of control they have over these factors contribute to the person's overall perception of behavioral control (Ajzen, 1985, 2013d).

Perceived behavioral control. Perceived behavioral control refers to a person's perception of whether he or she has an adequate amount of control over the factors that may facilitate his or her ability to perform during a PHE (Ajzen, 1985, 2013c).

Assumptions

The TPB is a theoretical framework assumed to provide a way of examining the underpinnings of PHE response. The TPB guided the measurement of constructs that are internal and personal in nature and represent perceptions of factors related to responding to PHEs. It is also assumed that the behavioral, normative, and control beliefs people embrace about PHE response, can vary as a function of a wide range of cultural, personal, and situational factors (Ajzen & Fishbein, 2005). Additionally, the unpredictable nature of the event itself may complicate measurement of the target behavior (Hsu & Kuo, 2003).

The cross-sectional design used for this study is assumed appropriate for the purpose of this study and has been used by numerous groups of researchers who explored HCP's PHE responses.

The use of a crafted, behavior-specific, TPB-based questionnaire is assumed to be the best method to measure the relationships among the TPB constructs (Fishbein & Ajzen, 2010; Francis et al., 2004). However, this method of data collection might have resulted in limitations to the validity of the study because study participants may under-report socially undesirable behavior and over-report socially desirable behavior (Polit & Beck, 2008, pp. 432-433).

Chapter III: Methodology

Research Design

In an effort to explain why some HCP are willing to respond to a PHE and others are not, a study examining variables associated with HCP's intent to respond to a future PHE was developed using the TPB as the theoretical framework. A cross-sectional survey design was employed to provide a "snapshot" of the variables related to intention to respond to a PHE in a sample of HCP working in the U. S. The survey elicited beliefs that were currently accessible in the minds of the study participants. A person's behavior is assumed to be guided by the beliefs that specifically shape the person's attitude, subjective norms, and perceived behavioral control (see Figure 2.2). This design was appropriate for identifying the accessible behavioral, normative, and control beliefs of HCP as they considered responding to a future PHE.

Population and Sample

The population of interest consisted of HCP (e.g., registered nurses, physicians, and pharmacists) who worked in various health care settings across the U. S. Posted flyers and e-mails were used to invite potential participants to complete the on-line survey. Three hundred and five people responded to the survey. Sample characteristics are described in Chapter IV.

Human Subjects Considerations

The University of Minnesota institutional review board reviewed and approved this survey study (0910E73094) prior to any participant recruitment or collection of data from this convenience sample (see Appendix A and B). Additional institutional approvals were obtained from each of the final six participating sites as required.

The use of a cross-sectional survey designed to obtain data from a convenience sample required several considerations to protect potential study participants. First, the web-based survey was anonymous: personal e-mail or internet protocol (IP) addresses were not retained in the database. No personal health information was collected. Data were entered in a protected database via a secure web interface and preserved on servers located and maintained by the University of Minnesota.

Participation was voluntary and participants did not need to answer every question on the survey. Informed consent was also web-based and included full explanation of the purpose of the research, procedures for assuring confidentiality, including the privacy of all data, and secure storage of completed surveys. Because the target population included individuals who were capable of making an autonomous decision, reading the informed consent document and completing the survey indicated the participants consent. Additionally, the sampling technique did not purposefully exclude any person who met the inclusion criteria.

Public Health Event (PHE) Survey

No all-purpose instruments exist to measure TPB constructs; they must be crafted to suit the specific target behavior and population of interest. Using the TPB as a guide, the instrument was constructed to assess the TPB constructs as they relate to the intent of HCP, who worked in the U. S., to respond to a future PHE (Ajzen, 2013; Francis, et al., 2004). Steps were taken during each phase of development to enhance instrument validity (DeVellis, 2003; Lynn, 1986; Sidani & Braden, 1998).

Phase I: Item development. An item pool was developed to measure the key TPB constructs with the target behavior defined as responding to a future PHE. Information was gained through informal discussions with colleagues who described their various roles and memories during an actual PHE experience. A pool of 63 items was generated. Specific subcomponents of each construct were considered in the development of this instrument. Items were constructed based on examples from existing TPB-based instruments (Ajzen, 2013; Duckett et al., 1998; Fishbein & Ajzen, 2010, pp. 449-464; O'Boyle, Henly, & Duckett, 2001) and consultation with experts in instrument development. The instrument (see Appendix C) was refined seven times before entering phase II with 45 scaled items.

Seven Likert-type items were created to measure the dependent variable, intention to respond to a future PHE. The items were designed to measure the intent of the participant to respond to different types and locations of PHEs that resulted in numerous sick or injured patients within the next 12 months. Ratings ranged from 1 *(extremely unlikely*) to 5 (*extremely likely*).

The six independent variables representing the TPB constructs were measured using specifically designed, behavior specific, 5-point Likert-type and semantic differential items. Eight Likert-type items assessed beliefs about the consequences of responding to a future PHE (i.e., “I will fulfill my duty to care when responding as a health care professional to an event resulting in a large number of sick and injured.”). Ratings for positively worded items ranged from 1 (*strongly disagree*) *to* 5 (*strongly agree*). Three negatively worded items were scored 1 (*strongly agree*) to 5 (*strongly disagree*).

Attitude toward the target behavior items were assessed via eight semantic differential items. The stem that preceded the scale items was “Responding as a health care provider to an event resulting in a large number of sick and injured would be . . .” which was followed by opposing word or phrase pairs (e.g., “bad” or “good”). Ratings ranged from 1 (for a negative value such as “*bad*”) to 5 (for a positive value such as “*good*”).

Four Likert-type items assessed normative beliefs. The items ratings ranged from 1 (*strongly disagree* [that the specific referent thinks participant should not respond]) to 5 (*strongly agree* [that a specific referent thinks participant should respond]). A single Likert-type item was used to assess subjective norm: “Overall, the people who are important in my life think I should respond . . . .” Ratings ranged from 1 (*strongly disagree*) to 5 (*strongly agree*).

Control beliefs were measured by 10 Likert-type items that assessed PHE survey participants’ perception of the amount of control they had over specific factors that could help or hinder their response to a future PHE (i.e., “I have the problem solving skills I need to respond effectively . . . .“ Ratings ranged from 1 (*strongly disagree*) to 5 (*strongly agree*).

Seven 5-point Likert-type scale items assessed perceived behavioral control. Three items had 5-point word pair response scales (e.g., “possible” and “impossible” or “complete control” and “no control”). Responses closest to “impossible” or “no control” were rated 1: the opposing words were rated 5. The other four 5-point Likert-type items also assessed whether the participant perceived an adequate amount of control over the factors that could facilitate PHE response (i.e., “I can provide safe patient care

as a health care professional . . . ."). The four item ratings ranged from 1 (*strongly disagree*) to 5 (*strongly agree*).

Phase II: Expert review. This phase was dedicated to evaluating the content validity of the 45-item questionnaire. A panel of five TPB experts and another panel of five experienced disaster response subject matter experts evaluated the 45-item survey instrument. Items receiving mixed reviews by the experts were either revised or eliminated. One member of the TPB expert panel did not rate the instrument as having content validity because it "did not contain the affective evaluations of the belief statements and ratings of motivation to comply with normative belief statements." After reviewing the literature and comments of the other four TPB panel members, affective evaluations of belief statements and ratings of motivation to comply were not included. There were measurement and practical reasons for this decision. Affective evaluations of the belief statements and ratings of motivation to comply with normative belief statements items have been used in some, but not in all studies using the TPB as the theoretical framework. Findings have been mixed with respect to whether they consistently increased the strength of relationships between the beliefs about outcomes and normative beliefs variables and other TPB variables (Francis, Johnston, Eccles, Grimshaw, & Kaner, 2004; O'Boyle, 1998). Furthermore, including these items substantially increases the length of an instrument.

Three subject matter experts suggested minor changes to the format. Overall, the five-person panel indicated the instrument contained valid items. Prior to submitting the research proposal to the institutional review board (IRB), the investigator verified the reading level, clarity of instructions, and the time needed to complete the

instrument. The estimated Flesch-Kincaid grade level (Flesch, 1948) was 11; this was considered appropriate for the targeted population. The PHE survey consisted of the 45 TPB-based Likert-type and semantic differential items described above (see Table 3.1), along with Likert-type, multiple-choice, and short-answer items used to assess sample characteristics.

Table 3.1

Variables and Measures in the Public Health Event (PHE) Survey

Variables	Measures	A Priori Scale Characteristic
Intention	The intent to respond to four PHE types (i.e., natural disaster, weather, terrorist, pandemic) and three locations (i.e., local community, state, another country).	7 Likert-type items α = .85
Beliefs about the outcomes of being a PHE responder	Individual's beliefs that responding to a future PHE will or will not result in a positive or negative outcome.	8 Likert-type items α = .51
Attitude toward being a PHE responder	Entailed a judgment about the value (positive or negative) of responding to a PHE.	8 semantic differential items α = .56
Perceptions of referents (significant others) beliefs about being a PHE responder	Person's perceptions about how significant others (i.e., friends, family, colleagues, boss) will judge his or her response to a future PHE.	4 Likert-type items α = .79

Subjective norm (social pressure) to respond or not respond to a PHE	Individual's perceptions of the overall social pressures to respond or not respond to a future PHE.	1 Likert-type item
Control beliefs relevant to PHE response	Individual's perception of whether he or she has an adequate amount of control over the factors that may facilitate his or her performance during a PHE.	10 Likert-type items α = .87
Perceived behavioral control (includes self-efficacy and controllability)	Person's perceptions of his or her ability to execute a specific behavior required to produce a desired outcome. Includes perceptions of controllability and self-efficacy (Bandura, 1977).	7 Likert-type items α = .69

Note. The TPB guided the development of the items designed to measure the seven constructs related to PHE response. The seven TPB constructs were measured by 45 items.

Following IRB approval (see Appendix A) and the award of grant funds from the University of Minnesota Simulations and Exercises for Educational Effectiveness (U-SEEE) project, which was supported in part through a grant from the Centers for Disease Control and Prevention (CDC/COPTER Grant Number 5P01TP000301-02) the instrument entered phase III.

Phase III: Beta test. In this phase, the technological aspects of the web-based survey and participant understanding of the items were assessed. Ten health care professionals completed the drafted on-line survey and were then interviewed regarding the amount of time needed to complete the survey and if there were any technical, formatting, or grammatical errors. Participants identified minor typographical errors in the survey and observed the time it took them to complete the survey was originally overestimated. One participant, who had experienced an actual PHE, indicated the survey had a pleasing appearance and was easy to follow. She expressed the opinion that the survey made her reflect on her experiences and her answers echoed these experiences as she selected her answers to the questions. She believed participants might have difficulty exaggerating their answers or providing erroneous data.

Instrument Validity and Reliability

Following data collection, full examination of the survey items was needed to determine if they formed internally consistent scales representing the constructs proposed by the TPB. In addition, various analyses were needed to determine if the nature and type of relationships among the measured variables fit with the TPB and

empirical findings. Sample characteristics were measured in order to describe the sample and compare the characteristics of this sample with samples described in the literature.

The PHE Survey was rigorously developed and pretested. Preliminary analysis of data obtained in phase III indicated the instrument appeared to be appropriately measuring the constructs posited by the TPB.

Study Procedures

Following phase III, the instrument was finalized (see Appendix C). The University of Minnesota Office of Measurement Services (OMS) staff opened the (PHE) Survey in August 2010. The OMS research liaison distributed invitations and reminders to the six site collaborators and managed all incoming data. The invitations included a description of the purpose of the research, target population, and a link to the survey. The on-line survey was available for 45 days and closed one week prior to the end of the funding period.

After ensuring this research met all institutional approvals, the six independent facility collaborators invited potential participants to participate in this research via posted flyers and e-mails announcing this project. In addition, HCP who worked at another facility, which prior to funding had withdrawn from the study, made a request to a nearby facility collaborator to be included in this research. The University of Minnesota IRB granted a change in protocol permitting these 22 individuals to participate in this project and access the survey from their home (see Appendix B). Two-hundred dollars was offered to site collaborators and a $20 E-gift card was offered to participants to compensate them for their time.

In order to receive the E-gift card, participants were required to submit a personal e-mail address. The OMS research liaison separated the personal e-mails from the survey responses then scrambled the order of receipt prior to forwarding the list to the individual who provided E-card codes to the participant. This process made it impossible to connect an individual to a specific survey and insured anonymity of the participant.

Data Analyses

The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 18 and Analysis of a Moment Structures (AMOS) (SPSS, 2009).

Aim 1. This aim was to evaluate the psychometric properties of the PHE Survey, an instrument designed to measure the seven major TPB concepts using Likert-type and semantic differential scales.

An item analysis of the data focused on each TPB-related item in the instrument. These analyses guided the creation of the seven scales that served as the observed variables for further analyses. The scales were generated by summing the responses for all items that were designed to measure the specific TPB construct. Inspection of the corrected item total correlations and Cronbach's alpha provided an estimate of the scale's reliability, one indicator of scale quality (Cronbach, 1951; Cronbach & Shavelson, 2004). If the estimated alpha improved without a particular item and if the corrected item total correlation was low (<.30), the item was deleted. Alphas equal to or greater than .70 were considered adequate. Pearson's correlations were used to measure linear associations between the predictor variables and the outcome variable.

Aim 2. This aim was to examine the differences between responses of nurses and those of other health care personnel. Correlations of the item responses in the two groups were examined. Nondirectional *t*-tests were used to compare the two mean scores of the six TPB predictor scales and the outcome variable scale scores. Associations between the group and intention to respond to various types of PHEs were investigated using chi-squared tests for independence. The nominal type I error rate was set at .05.

Aim 3. The third aim was to estimate a series of TPB-based observed variable structural equation models for prediction of intent to respond and to explore moderating and mediating effects. A model generating approach was used (Bollen, 1989; Byrne, 2010). Post hoc model modifications were based on fit, parsimony, and theoretical interpretability. Mediation effects posited by the TPB were assessed using Baron and Kenny's (1986) causal step tests and the Sobel test (MacKinnon, 2008; Preacher & Leonardelli, 2010). Possible moderating effects were assessed through examination of changes in the relationships between predictors and intention through a series of estimated TPB-based models using subsets of the sample (i.e., professional affiliation).

Chapter IV: Results

Setting

Six health care facilities in the U. S. were sites for this study. Two facilities, associated with a regional health care system, were located in urban areas along the Eastern Seaboard. Two were situated along the Gulf Coast: one was part of a statewide health care system of clinics and hospitals in Louisiana; the other was a community hospital along the coast in Mississippi. A large teaching hospital in southern California and a 200-bed community hospital in the upper Midwest also were study sites.

Sample

A convenience sample of 305 HCP completed the web-based instrument and all data were imported into SPSS (2009) from the protected University of Minnesota server (see Table 4.1).

Table 4.1

Original Sample Characteristic

	Nurse [a] *n* (%)	Physician [a] *n* (%)	Pharmacist [a] *n* (%)	Dentist [a] *n* (%)	Other [a] *n* (%)
Years of practice [b]					
Less than 1 year	4 (2)	0	4 (14)	0	0
1 to 3 years	19 (8)	1 (6)	8 (28)	0	5 (33)
4 to 6 years	25 (10)	2 (13)	7 (24)	0	1 (7)
7 to 9 years	18 (7)	4 (25)	1 (3)	0	2 (13)
10 to 15 years	50 (21)	3 (19)	2 (7)	0	3 (20)
16 years or greater	126 (52)	5 (31)	7 (24)	1 (100)	4 (27)
Missing [c]	2 (1)	1 (6)	0	0	0
Practice Setting [b]					
Civilian Hospital	190 (78)	8 (50)	20 (69)	0	6 (40)
Civilian Clinic	30 (11)	8 (50)	6 (21)	1 (100)	4 (27)
Military Hospital	3 (1)	0	1 (3)	0	0
Military Clinic	3 (1)	0	0	0	0
VA System	1 (.4)	0	0	0	1 (7)
VA Clinic	0	0	0	0	0
Other	16 (6)	0	2 (7)	0	4 (26)
Missing [c]	1	0	0	0	0
Sex [b]					
Female	221 (91)	11 (69)	11 (38)	0	10 (3)
Male	21 (7)	5 (31)	18 (62)	1 (100)	5 (2)
Missing [c]	2 (1)	0	0	0	0

Race/Ethnicity [b]					
Asian	5 (2)	1 (6)	1 (3)	1 (100)	0
African American	7 (3)	1 (6)	1 (3)	0	0
Latino	3 (1)		0	0	2 (13)
Caucasian	220 (90)	13 (81)	27 (93)	0	12 (80)
Other or mixed	8 (3)	1 (6)	0	0	1 (7)
Missing [c]	1 (1)	0	0	0	0
Actual PHE experience [b]	49 (20)	3 (19)	2 (7)	0	6 (40)
Missing [c]	0	0	0	0	0
Received PHE related education [b]	241 (99)	16 (100)	28 (99)	1 (100)	15 (100)
Missing [c]	1	0	1 (3)	0	0
PHE response team member [b]	33 (14)	2 (12)	6 (21)	0	4 (27)
Missing [c]	0	0	0	0	0
Age (*M*)	44	44	36	54	44
Missing [c]	27 (11)	1 (6)	1 (3)	0	1 (7)

Note. Some percentages do not add to 100 due to rounding error. [a] Professional affiliation based on the total number of participants (*N* = 305): Nurses *n* = 244 (80%); Physician *n* = 16 (5%); Pharmacist *n* = 29 (10%); Dentist *n* = 1 (<1%); Other *n* = 15 (5%). [b] Values represent number responding and percentage based on the total number of the specific professional group (*n* and column %). [c] Some participants did not provide complete demographic information.

Although the education and professional responsibilities of 15 HCP did not seem to initially meet the inclusion criteria of the targeted population (e.g., registered nurse, physician, dentist, or pharmacist), further review revealed that each respondent fulfilled a health care position that served a vital role in PHE response (see Table 4.2). All 15 cases were retained for analysis.

Table 4.2

Characteristics of the Other HCP Group (n = 15)

Education	Professional Responsibilities
Medical Supply and Logistics	Facility Emergency Response Manager
LVN	Emergency and Trauma Unit
EMT	City Emergency Response Planner
Master of Social Work	Medical Center Social Worker
Respiratory Therapist	Critical Care and Trauma
EMT	Emergency Care Attendant
Facility Management	Hospital Facility Manager
Surgical Technologist	No information provided
Health Service Management	Patient Registration and Accounting
Hospital Red Cross Liaison	No information provided
EMT	No information provided
Laboratory Technician	Laboratory and Diagnostics Manager
Physician Assistant	Trauma and Emergency
Physician Assistant	Family Practice
Paramedic	City Fire Department Emergency Preparedness Coordinator

Prior to analysis, data were examined for potential outliers who did not appear to fit with the rest of the data and could exert undue influence over the associations among the predictor variables and the outcome variable. Five cases were repeatedly identified as possible outliers in the box and scatter plots of the 45 items that

measured the TPB constructs. When standardized values (*Z*-scores) were calculated, a new distribution for each of the 45 items was created with a mean of 0 and a standard deviation of 1. Three cases had values greater than 1.96 or less than – 1.96 on two to four of the 45 items and two cases had values greater than 1.96 or less than – 1.96 on several of the 45 items. These five cases were the same cases identified in the box and scatter plots. After further examination of residuals, leverage, Cook's, and Mahalanobis distance calculations, two cases were confirmed to be influential outliers (Field, 2009). These two cases were not included in further analyses (see Table 4.3 and 4.4).

Table 4.3

Summary of Analysis of Influential Outliers

Case	Range of *Z*-Scores on Items	Studentized Residuals	Leverage	Cook's Distance	Mahalanobis Distance
A	.06 to - 6.82	-3.44	.12	.23	35.58
B	-.02 to - 7.03	1.5	.14	.10	43.02
Acceptable Range	Between + 1.96 and - 1.96	>3.0	<.045	<.013	<25

Note. The *Z*-score transformation standardizes variables to the same scale, which produces new variables with a mean of 0 and a standard deviation of 1. In a normally distributed sample, 95% of the Z-scores should fall between +/- 1.96 (SPSS, 2009). Linear regression analysis was used to obtain Studentized residuals, leverage, Cook's distance and Mahalanobis distance calculations. Leverage values larger than (2(k+1)/*n* were considered potentially influential (k is number of predictors; *n* is the sample size of 305). Cook's distance values larger than 4/*n* were considered influential. Mahalanobis distance values greater than 25 were considered influential.

Table 4.4

Characteristics of Deleted Cases

	Case A	Case B
Profession	Nurse	Nurse
Years of practice	Greater than 16	8
Practice Setting		
Civilian Hospital		x
Other	Academic	
Mean Age in years	40	56
Sex		
Male	x	x
Race/Ethnicity		
Caucasian	x	x
Actual PHE experience	yes	no
Received PHE related education	no	no
PHE response team member	no	no

Note. These two cases were identified as influential univariate and multivariate outliers and were not included in further analyses.

Data were also examined for missing values related to the six TPB predictor variables and the outcome variable. After visually inspecting the responses to each item, no items or cases stood out as having a large amount (>5%) of missing or incomplete data. Missing values appeared to be sporadically distributed among the items and the individual cases. Therefore, no further cases were considered for deletion.

The analytic sample consisted of 303 cases. The majority of respondents were registered nurses (80%). The preponderance of the survey participants worked in civilian health care settings (90%), were female (83%), and Caucasian (91%). Age

of the participants ranged between 22 and 67 years with a mean age of 43. Sixty-six percent had practiced in a health care profession for over ten years and just 3% had practiced for less than one year. The sample was varied on PHE experiences. Forty-five (15%) indicated they were members of an emergency response team, 301 (99%) had received some type of PHE related education, and 59 (19%) had actual PHE response experience (see Table 4.5).

The largest group of participants was affiliated with the profession of nursing (see Table 4.6). Although nurses work in a variety of settings, the majority of this sample (78%) was employed in a hospital and reported practicing nursing for 16 or more years. The majority of the nurses were female (91%) and were Caucasian. There were approximately 12 female nurses for every male nurse in this sample. Forty-five percent of this sample of nurses was educated at a bachelor's level with 8% who had received a master's or doctorate degree. Over half of the 90 nurses with an associate degree had practiced in the nursing profession for 16 or more years. Almost all of the nurses had received some type of PHE related education, but just 20% had actual PHE experience.

Table 4.5

Final Sample Characteristics (N = 303*)*

	Nurse [a] *n* (%)	Physician [a] *n* (%)	Pharmacist [a] *n* (%)	Dentist [a] *n* (%)	Other [a] *n* (%)
Years of practice [b]					
Less than 1 year	4 (2)	0	4 (14)	0	0
1 to 3 years	19 (8)	1 (6)	8 (28)	0	5 (33)
4 to 6 years	25 (10)	2 (13)	7 (24)	0	1 (7)
7 to 9 years	17 (7)	4 (25)	1 (3)	0	2 (13)
10 to 15 years	50 (21)	3 (19)	2 (7)	0	3 (20)
16 years or greater	125 (52)	5 (31)	7 (24)	1 (100)	4 (27)
Missing [c]	2 (1)	1 (6)	0	0	0
Practice Setting [b]					
Civilian Hospital	189 (78)	8 (50)	20 (69)	0	6 (40)
Civilian Clinic	30 (11)	8 (50)	6 (21)	1 (100)	4 (27)
Military Hospital	3 (1)	0	1 (3)	0	0
Military Clinic	3 (1)	0	0	0	0
VA System	1 (.4)	0	0	0	1 (7)
VA Clinic	0	0	0	0	0
Other [d]	15 (6)	0	2 (7)	0	4 (26)
Missing [c]	1	0	0	0	0
Sex [b]					
Female	221 (91)	11 (69)	11 (38)	0	10 (3)
Male	19 (8)	5 (31)	18 (62)	1 (100)	5 (2)
Missing [c]	2 (1)	0	0	0	0

Race/Ethnicity [b]					
Asian	5 (2)	1 (6)	1 (3)	1 (100)	0
African American	7 (3)	1 (6)	1 (3)	0	0
Latino	3 (1)		0	0	2 (13)
Caucasian	218 (90)	13 (81)	27 (93)	0	12 (80)
Other or mixed	8 (3)	1 (6)	0	0	1 (7)
Missing [c]	1 (1)	0	0	0	0
Actual PHE experience [b]	48 (20)	3 (19)	2 (7)	0	6 (40)
Missing [c]	0	0	0	0	0
Received PHE related education [b]	241 (99)	16 (100)	28 (99)	1 (100)	15 (100)
Missing [c]	1 (1)	0	1 (3)	0	0
PHE response team member [b]	33 (14)	2 (12)	6 (21)	0	4 (27)
Missing [c]	0	0	0	0	0
Age (*M*)	44	44	36	54	44
Missing [c]	27 (11)	1 (6)	1 (3)	0	1 (7)

Note. Some percentages do not add to 100 due to rounding error.

[a] Professional affiliation based on the total number of participants (*N* = 303): Nurses *n* = 242 (80%); Physician *n* = 16 (5%); Pharmacist *n* = 29 (10%); Dentist *n* = 1 (<1%); Other *n* = 15 (5%). [b] Values represent number responding and percentage based on the total number of the specific professional group (*n* and column %). [c] Some participants did not provide complete demographic information. [d] Other work settings included academia, community and public health positions.

Table 4.6

Nurse Sample Characteristics (n = 242)

	Nurse [a] *n* (%)	Associate [b] *n* (%)	Bachelor [b] *n* (%)	Master [b] *n* (%)	Professional Doctorate [b] *n* (%)	PhD [b] *n* (%)
Years of practice [b]						
Less than 1 year	4 (2)	3 (3)	1 (1)	0	0	0
1 to 3 years	19 (8)	5 (6)	13 (12)	0	1	0
4 to 6 years	25 (10)	12 (13)	13 (12)	0	0	0
7 to 9 years	17 (7)	4 (4)	9 (8)	4 (10)	0	0
10 to 15 years	50 (21)	15 (17)	27 (25)	8 (20)	0	0
16 years or greater	125 (52)	50 (56)	44 (41)	29 (71)	0	2 (100)
Missing [c]	2 (1)	1	1	0	0	0
Practice Setting [b]						
Civilian Hospital	189 (78)	80 (89)	89 (82)	19 (46)	1	0
Civilian Clinic	30 (11)	9 (10)	9 (8)	12 (29)	0	0
Military Hospital	3 (1)	0	1	2 (5)	0	0
Military Clinic	3 (1)	0	1 (1)	2 (5)	0	0
VA System	1 (.4)	0	0	1 (2)	0	0
VA Clinic	0	0	0	0	0	0
Other [d]	15 (6)	1 (1)	7 (7)	5 (12)	0	2 (100)
Missing [c]	0	0	1	0	0	0
Sex [b]						
Female	221 (91)	82 (91)	98 (91)	38 (93)	1	2 (100)
Male	19 (8)	7 (8)	9 (8)	3 (7)	0	0
Missing [c]	2 (1)	1	1	0	0	0

Race/Ethnicity [b]						
Asian	5 (2)	0	3 (3)	2 (5)	0	0
African American	7 (3)	2 (2)	1 (1)	4 (10)	0	0
Latino	3 (1)	2 (2)	1 (1)	0	0	0
Caucasian	218 (90)	83 (92)	98 (1)	34 (83)	1	2 (100)
Other [e]	8 (3)	3 (3)	5 (5)	0	0	0
Missing [c]	1 (1)	0	0	1	0	0
Actual PHE experience [b]	48 (20)	12 (13)	18 (17)	17 (42)	1	1 (50)
Missing [c]	0	0	0	0	0	0
Received PHE related education [b]	241 (99)	54 (60)	72 (67)	34 (83)	1	1 (50)
Missing [c]	1	0	1	0	0	0
PHE response team member [b]	33 (14)	10 (11)	15 (14)	8 (19)	1	2 (100)
Missing [c]	0	0	0	0	0	0
Age (*M*)	44	44	40	50	27	58
Missing [c]	27 (11)	16 (18)	10 (9)	1 (2)	0	0

Note. . Some percentages do not add to 100 due to rounding error [a] Data represent the number of participants who self-identified as a nurse (*n* = 242) based on the total number of participants (*N* = 303). [b] Highest nursing related education level based on *n* = 242: Associate *n* = 90 (37%); Bachelor *n* = 108 (45%); Master *n* = 17 (1%); Professional doctorate *n* = 1 (<1%); PhD *n* = 2 (1%). Values represent number responding and percentage based on the total number of the nurses who indicated the specific educational degree as their highest degree (*n* and column %). [c] Some participants did not provide complete demographic information. [d] Other work settings included public or community health and academic associations. [e] Other ethnic descriptions included a mixture of ethnicity or East Indian.

Results for Each Specific Aim

Aim 1: Evaluate the Responses to the PHE Survey Including Psychometric Properties of the TPB-based Scales

Item analysis. Classical test theory based statistics were used to evaluate the psychometric properties of the PHE survey that was designed to measure the key concepts posited by the TPB. The 45 Likert-type and semantic differential items were used to measure the seven TPB constructs. Responding to a future PHE event was the target behavior (see Table 3.1). Items were examined for missing values, the corrected item total correlations (*r*), and Cronbach's alpha (α) (Crocker & Algina, 1986; Cronbach, 1951; Cronbach & Shavelson, 2004).

The corrected item total correlation is a correlation between the item score and the overall score with the item deleted. This relationship helps to discriminate between items that appear to perform well and those that perform poorly. A value less than .30 suggested the item might not correctly measure the underlying construct. Cronbach's alpha is a coefficient of reliability (Cronbach, 1951). A value of .70 was considered an adequate measure of reliability.

Beliefs about outcomes. Table 4.7 includes the item responses for the eight a priori 5-point Likert-type items that were developed to measure the TPB construct, beliefs about outcomes. Missing values did not exceed 2% of the total possible responses. Examination of the corrected item total correlations revealed that some items, such as "I will lose sleep when responding to a PHE. . . .", did not appear to contribute to the measurement of this construct ($r = .09$). Cronbach's alpha, with the tem deleted, indicated that the reliability of the scale improved without this item.

Therefore, this item was not included in the final scale. This process was repeated until all the items appeared to contribute to the measurement of this construct as determined by a corrected item total correlation greater than .30 and Cronbach's alpha did not improve with any further item deletions. The final scale included five items with a scale mean of 23.8, *SD* = 1.82, and a Cronbach's α of .85 (see Table 4.8).

Attitude. The responses to the eight semantic differential items used to measure the concept of attitude are included in Table 4.9. Missing values ranged between 2% to 3%. The eight item scale mean and *SD* = 28.97 (3.77) with a Cronbach's α = .56. The inter-item correlations and item total statistics were examined. Items with the lowest corrected item-total correlations were candidates for deletion, especially if Cronbach's alpha improved without the item. Calculations were repeated six additional times. The final scale included two items (see Table 4.10). Two percent of the values were missing from the final scale. The final 2- item scale mean and standard deviation was 8.74 (1.52) with a Cronbach's α estimated at .78.

Table 4.7

Initial Beliefs About Behavioral Outcomes Item Analysis

Item	Missing *n* (%)	1 Strongly Disagree *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Strongly Agree *n* (%)	*M* (*SD*)	*r*
I will use my professional knowledge and skills to help others	0	0	0	1 (.3)	52 (17)	250 (83)	4.82 (.40)	.32
I will use my knowledge and skills of emergency response to help others	0	1 (.3)	0	5 (2)	65 (22)	232 (77)	4.74 (.52)	.29
I will fulfill my duty to care	0	1 (.3)	0	2 (1)	76 (25)	224 (74)	4.73 (.48)	.24
I will provide appropriate care	1 (.3)	0	0	3 (1)	69 (23)	230 (76)	4.75 (.46)	.34
I will distribute resources in ways that prevent as much death and disability as possible	5 (2)	0	0	2 (1)	80 (26)	216 (71)	4.72 (.47)	.31
		1 Strongly Agree	2	3	4	5 Strongly Disagree		
I will endanger my life [a]	0	27 (9)	79 (26)	100 (33)	77 (25)	20 (7)	3.04 (1.07)	.24
I will lose sleep [a]	2 (.7)	102 (34)	137 (45)	37 (12)	24 (8)	1 (.3)	1.96 (.90)	.09
I will place my family at increased risk [a]	0	3 (1)	19 (6)	55 (18)	114 (37)	112 (37)	4.03 (.95)	.32

Note. All items end with the phrase ". . . when responding as a health care professional to an event resulting in a large number of sick and injured." Missing values indicate the number and percentage of participants who did not answer each item (N = 303). Item scale is indicated at the top and all items are shown as they were scored. Potential scores for each item ranged from 1 to 5. Scale mean for all 8 items = 32.79; SD = 2.66; α= .51. Corrected Item Total Correlation (r) [a] These items were negatively keyed.

Table 4.8

Final Beliefs About Behavioral Outcomes Item Analysis

Item	Missing *n* (%)	1 Strongly Disagree *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Strongly Agree *n* (%)	*M* (*SD*)	Corrected Item Total Correlation *r*
I will use my professional knowledge and skills to help others	0	0	0	1 (.3)	52 (17)	250 (83)	4.82 (.40)	.70
I will use my knowledge and skills of emergency response to help others	0	1 (.3)	0	5 (2)	65 (22)	232 (77)	4.74 (.52)	.63
I will fulfill my duty to care	0	1 (.3)	0	2 (1)	76 (25)	224 (74)	4.73 (.48)	.68
I will provide appropriate care	1 (.3)	0	0	3 (1)	69 (23)	230 (76)	4.75 (.46)	.66
I will distribute resources in ways that prevent as much death and disability as possible	5 (2)	0	0	2 (1)	80 (26)	216 (71)	4.72 (.47)	.65

Note. All items end with the phrase ". . . when responding as a health care professional to an event resulting in a large number of sick and injured." Missing values indicate the number and percentage of participants who did not answer each item (*N* = 303). Item scale is indicated at the top and all items are shown as they were scored. Potential scores for each item ranged from 1 to 5. Scale mean for all five items = 23.76; *SD* = 1.82; α= .85.

Table 4.9

Initial Attitude Item Analysis

Semantic Differential Word or Phrase	Missing *n* (%)	1 *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 *n* (%)	Semantic Differential Word or Phrase	*M* (*SD*)	Corrected Item Total Correlation *r*
frightening	6 (2)	49 (16)	99 (33)	86 (28)	41 (14)	22 (7)	not frightening	2.62 (1.14)	.27
not exciting	8 (3)	26 (9)	17 (6)	78 (26)	111 (36)	63 (21)	exciting	3.57 (1.15)	.29
waste of my time	7 (2)	0	4 (1)	23 (8)	113 (37)	156 (52)	good use of my time	4.42 (.70)	.29
not rewarding	7 (2)	9 (3)	10 (3)	19 (6)	76 (25)	182 (60)	rewarding	4.39 (.97)	.08
bad	7 (2)	4 (1)	10 (3)	35 (12)	88 (29)	159 (53)	good	4.31 (.91)	.40
harmful	7 (2)	2 (1)	5 (2)	23 (8)	97 (32)	169 (56)	beneficial	4.44 (.77)	.42
dangerous	10 (3)	43 (14)	121 (40)	106 (35)	15 (5)	8 (3)	not dangerous	2.40 (.90)	.15
uncomfortable	7 (2)	36 (12)	77 (25)	111 (36)	53 (18)	20 (7)	comfortable	2.81 (1.10)	.30

Note. The stem for this group of semantic differential items was, “Responding as a health professional to an event resulting in a large number of sick and injured would be . . . .” Missing values indicate the number and percentage of participants who did not answer each item based on an $N = 303$. The semantic differential word or phrase pairs appear as they were scored not as they appeared on the PHE survey in Appendix C (i.e., location of word pairs or phrases). Potential scores for each item ranged from 1 to 5. Scale mean for all 8 items = 28.97; $SD = 3.77$; $\alpha = .56$.

Table 4.10

Final Attitude Item Analysis

Semantic Differential Word or Phrase	Missing *n* (%)	1 *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 *n* (%)	Semantic Differential Word or Phrase	*M* (*SD*)	Corrected Item Total Correlation *r*
bad	7 (2)	4 (1)	10 (3)	35 (12)	88 (29)	159 (53)	good	4.31 (.91)	.65
harmful	7 (2)	2 (1)	5 (2)	23 (8)	97 (32)	169 (56)	beneficial	4.44 (.77)	.65

Note. The stem for this group of semantic differential items was, "Responding as a health professional to an event resulting in a large number of sick and injured would be . . . ." Missing values indicate the number and percentage of participants who did not answer each item based on an *N* = 303. The semantic differential word or phrase pairs appear as they were scored not as they appeared on the PHE survey in Appendix C (i.e., location of word pairs or phrases). Potential scores for each item ranged from 1 to 5. Scale mean for the two items = 8.74; *SD* = 1.52; α= .78.

Referent beliefs. All four of the a priori 5-point Likert-type items were retained after examining the inter-item correlations and Cronbach's alpha. For all four items, the scale mean and *SD* = 15.78 (2.58) with a Cronbach's α of .79 (see Table 4.11). At most, 1% of responses were missing. Item means ranged between 3.69 *SD* = (.98) and 4.10 *SD* = (.73). Inter-item correlations ranged between .57 and .68. Analysis of an additional item, not linked to the TPB, provided supplementary information regarding coworker behavior during a PHE (see Table 4.12).

Subjective norm. A single 5-point Likert-type item was used to measure this construct. The scale mean and *SD* = 4.02 (.75) and less than 1% of responses were missing from this scale (see Table 4.13).

Table 4.11

Referent Beliefs Item Analysis

Item	Missing *n* (%)	1 Strongly Disagree *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Strongly Agree *n* (%)	*M* (*SD*)	Corrected Item Total Correlation *r*
My closest family members	1 (.3)	6 (2)	30 (10)	78 (26)	123 (41)	65 (22)	3.69 (.98)	.57
My boss	1 (.3)	0	6 (2)	67 (22)	125 (41)	104 (34)	4.09 (.80)	.57
My colleagues	4 (1)	0	3 (1)	58 (19)	145 (48)	93 (31)	4.10 (.73)	.68
My friends	1 (.3)	1 (.3)	7 (2)	74 (24)	158 (52)	62 (21)	3.90 (.75)	.63

Note. All items end with the phrase: ". . . think I should respond as a health care professional to an event resulting in a large number of sick and injured." Missing values indicate the number and percentage of participants who did not answer each item (*N* = 303). Item scale is indicated at the top and all items are shown as they were scored. Potential scores for each item ranged from 1 to 5. Scale mean for the four items = 15.78; *SD* = 2.58; α= .79.

Table 4.12

Item Analysis of Perceived Coworker Response to a Public Health Event

Item	1 Strongly Disagree *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Strongly Agree *n* (%)
I believe the majority of my coworkers will come to work	2 (.7)	19 (6.2)	27 (9)	159 (52)	98 (32)

Note. The phrase ends with " . . .when a public health event occurs and results in a large number of sick and injured." This Likert-type item was included in the PHE survey, but is not linked to the TPB. Scale scores are indicated on the top of the table and item is shown as it is scored. Potential scores ranged from 1 to 5. Mean scale score = 4.10, *SD* =.83, *N* = 303.

Table 4.13

Subjective Norm Item Analysis

Item	Missing *n* (%)	1 Strongly Disagree *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Strongly Agree *n* (%)	*M* (*SD*)
Overall, the people who are important in my life think I should respond as a health care professional to an event resulting in a large number of sick and injured.	2 (.7)	0	10 (3)	50 (17)	164 (54)	77 (25)	4.02 (.75)

Note. Missing values indicate the number and percentage of participants who did not answer each item based on an *N* = 303. The item is shown as it was scored. Scores are indicated at the top of the table and the potential scores for each item ranged from 1 to 5.

Control beliefs. Table 4.14 includes the item responses for the 10 a priori 5-point Likert-type items that were designed to measure the subjective evaluation of internal and external factors that could help or hinder a person's performance of a specific behavior, such as PHE response. Missing values did not exceed 1% of the total possible responses. All 10 items were retained after examining the inter-item correlations and Cronbach's alpha. The item means and standard deviations ranged between 3.78 (.89) and 4.45 (.56). The inter-item correlations ranged from .42 to .68. The scale mean and standard deviation for all 10 items was 40.98 (5.20) with a Cronbach's α of .87.

Perceived behavioral control. The responses to the seven 5-point word pair responses and Likert-type items are presented in Table 4.15. Two items appeared to contain complete data, but the other five items were missing between .3% and 1% of their values. Examination of the inter-item correlations suggested that the items with the lowest correlations were candidates for deletion. If Cronbach's alpha improved without the item, the item was deleted. Calculations were repeated until all the items seemed to contribute to the measurement of this construct. The final scale included five items (see Table 4.16) and 1% of the data were missing. The final scale item means ranged between 3.81 (.60) and 4.38 (.66). The inter-item correlations ranged between .64 and .88. The scale mean and standard deviation was 21.00 (2.56) with a Cronbach's α of .80.

Table 4.14

Control Beliefs Item Analysis

Item	Missing *n* (%)	1 Strongly Disagree *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Strongly Agree *n* (%)	*M* (*SD*)	Corrected Item Total Correlation *r*
I have the knowledge [a]	0	3 (1)	27 (9)	31 (10)	164 (54)	78 (26)	3.95 (.90)	.62
I have the psychomotor skills [a]	1 (.3)	2 (1)	5 (2)	14 (5)	165 (55)	116 (38)	4.28 (.69)	.67
I have the triage skills [a]	0	4 (1)	31 (10)	50 (17)	147 (49)	71 (23)	3.82 (.96)	.64
I have the team leadership skills [a]	0	1 (.3)	12 (4)	41 (14)	149 (49)	100 (33)	4.10 (.81)	.68
I have the team membership skills [a]	0	0	2 (.7)	9 (3)	152 (50)	140 (46)	4.42 (.59)	.60
I have the problem solving skills [a]	0	0	4 (1)	12 (4)	178 (59)	109 (36)	4.29 (.61)	.64
I have the interpersonal skills [b]	2 (.7)	0	1 (.3)	6 (2)	152 (50)	142 (47)	4.45 (.56)	.64
I can creatively use scarce resources [c]	3 (1)	0	8 (3)	56 (19)	149 (49)	87 (29)	4.05 (.76)	.58
I will be able to make the necessary arrangements at work [d]	0	3 (1)	24 (8)	73 (24)	138 (45)	65 (21)	3.78 (.89)	.42
I can make the necessary arrangements to cover my personal responsibilities [d]	1 (.3)	2 (.7)	21 (7)	62 (21)	161 (53)	56 (19)	3.82 (.83)	.44

Note. Missing values are the number and percentage of missing data based on *N* = 303. Items are shown as they were scored. Item scores ranged from 1 to 5. Scale mean for the 10 items = 40.98; *SD* = 5.20; α= .87. [a] Items end with, ". . . I need to respond effectively to an event resulting in a large number of sick and injured." [b] ". . . to respond effectively to the sick and injured that result from a public health event." [c] ". . . when responding to an event resulting in a large number of sick and injured." [d] ". . . if I want to respond to an event involving a large number of sick and injured individuals."

Table 4.15

Initial Perceived Behavioral Control Item Analysis

Item	Missing *n* (%)	1 *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 *n* (%)	*M* (*SD*)	*r*
				Word Pair Response				
		Impossible				Possible		
It would be _____for me to provide appropriate care [a]	0	0	6 (2)	25 (8)	132 (44)	140 (46)	4.35 (.70)	.56
It would be _____for me to respond effectively [b]	1 (.3)	0	3 (1)	24 (8)	134 (44)	141 (47)	4.38 (.66)	.57
		No Control				Complete Control		
How much control will you have over your personal well-being during an event resulting in a large number of sick and injured?	0	12 (4)	40(13)	105(35)	119 (40)	27 (9)	3.94 (.96)	.27
				Likert-type Response				
		Strongly Disagree				Strongly Agree		
It is up to me whether or not I respond [c]	3 (1)	5 (2)	28 (9)	33 (11)	149 (49)	85 (28)	4.35 (.60)	.09
I can provide safe patient care [d]	3 (1)	0	1(.3)	17 (6)	159 (52)	123 (40)	3.81 (.60)	.58
I can find resources needed to care for patients [e]	2 (.7)	0	18 (6)	76 (25)	152 (50)	55 (18)	3.82 (.80)	.44
I can take care of myself [e]	2 (.7)	0	4 (1)	37 (12)	180 (59)	80 (26)	4.12 (.66)	.53

Note. Missing values are the number and percentage of missing data (*N* = 303). Items are shown as they were scored. Item scores ranged from 1 to 5. Scale mean for the seven items = 28.32; *SD* = 3.19; α= .68. Corrected Item Total Correlation (*r*).
[a] Items end with, " . . . as a health professional to a large number of sick and injured due to a PHE." [b] ". . . as a health professional to a PHE resulting in a large number of sick and injured." [c]". . . as a health care professional to an event resulting in a large number of sick and injured." [d] ". . . as a health care professional when responding to an event resulting in a large number of sick and injured." [e] ". . . when responding to an event resulting in a large number of sick and injured."

Table 4.16

Final Perceived Behavioral Control Item Analysis

Item	Missing *n* (%)	1 *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 *n* (%)	*M* (*SD*)	Corrected Item Total Correlation *r*
				Word Pair Response				
		Impossible				Possible		
It would be _____for me to provide appropriate care [a]	0	0	6 (2)	25 (8)	132 (44)	140 (46)	4.35 (.70)	.64
It would be _____ for me to respond effectively [b]	1 (.3)	0	3 (1)	24 (8)	134 (44)	141 (47)	4.38 (.66)	.75
				Likert-type Response				
		Strongly Disagree				Strongly Agree		
I can provide safe patient care [c]	3 (1)	0	1 (.3)	17 (6)	159 (52)	123 (40)	3.81 (.60)	.76
I can find resources needed to care for patients [d]	2 (.7)	0	18 (6)	76 (25)	152 (50)	55 (18)	3.82 (.80)	.78
I can take care of myself [d]	2 (.7)	0	4 (1)	37 (12)	180 (59)	80 (26)	4.12 (.66)	.77

Note. Missing values are the number and percentage of missing data (*N* = 303). Items are shown as they were scored. Item scores ranged from 1 to 5. Scale mean for the four items = 21.00; *SD* = 2.56; α= .80.

[a] Items end with," . . . as a health professional to a large number of sick and injured due to a PHE." [b] ". . . as a health professional to a PHE resulting in a large number of sick and injured." [c]". . . as a health care professional when responding to an event resulting in a large number of sick and injured." [d] ". . . when responding to an event resulting in a large number of sick and injured."

Intention. Seven, 5-point Likert-type scales were used to measure whether response to a PHE was unlikely (*1*) or likely (*5*). Each item in the scale had between .3% and 1% missing values. Item means and standard deviations ranged between 2.08 (1.19) and 4.31 (.78) and none of the items appeared to have corrected item total correlations less than .30 (see Table 4.17). However, four of the items measured the likelihood of PHE response to different *types* of PHEs, and three items measured the likelihood of PHE response based on the *location* of PHEs.
The different focus of the items led to the scale recalculation with the three *location* items removed. Cronbach's alpha did improve slightly, thus the final scale used to measure intention contained the four items that measured the willingness to respond to different types of PHEs (see Table 4.18). The final scale mean and standard deviation was 16.43 (3.2) with a Cronbach's α of .90.

Table 4.17

Intention Item Analysis Seven Item Scale

Public Health Event	Missing *n* (%)	1 Strongly Disagree *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Strongly Agree *n* (%)	*M* (*SD*)	Corrected Item Total Correlation *r*
				Event Type [a]				
severe weather event	1 (.3)	1 (.3)	12 (4)	28 (9)	119 (39)	142 (47)	4.29 (.82)	.70
terrorist attack	4 (1)	5 (2)	14 (5)	51 (17)	121 (40)	108 (36)	4.05 (.93)	.71
natural disaster	4 (1)	1 (.3)	10 (3)	22 (7)	127 (42)	139 (46)	4.31 (.78)	.75
infectious disease outbreak	2 (.7)	8 (3)	19 (6)	81 (27)	108 (36)	85 (28)	3.81 (1.00)	.66
				Location [b]				
my community	1 (.3)	1 (.3)	4 (1)	11 (4)	110 (36)	176 (58)	4.51 (.66)	.54
another state	1 (.3)	44 (15)	75 (25)	90 (30)	69 (23)	24 (8)	2.85 (1.17)	.61
another country	2 (.7)	131 (43)	71 (23)	54 (18)	33 (11)	12 (4)	2.08 (1.19)	.44

Note. Missing values are the number and percentage of missing data based on an $N = 303$. Items are shown as they were scored. Scores for each item ranged from 1 to 5. Scale mean for all seven items = 25.8, $SD = 4.84$, $\alpha = .85$.

[a] Item phrase is, "I would respond to a/an *event type* resulting in numerous sick or injured patients if one were to occur within the next 12 months."

[b] Item phrase is, "I would respond to an event resulting in numerous sick or injured patients in *location* if one were to occur within the next 12 months."

Table 4.18

Intention Item Analysis Four Item Scale

Public Health Event	Missing *n* (%)	1 Strongly Disagree *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Strongly Agree *n* (%)	*M* (*SD*)	Corrected Item Total Correlation *r*
natural disaster	4 (1)	1 (.3)	10 (3)	22 (7)	127 (42)	139 (46)	4.31 (.78)	.85
severe weather	1 (.3)	1 (.3)	12 (4)	28 (9)	119 (39)	142 (47)	4.29 (.82)	.79
terrorist attack	4 (1)	5 (2)	14 (5)	51 (17)	121 (40)	108 (36)	4.05 (.93)	.82
infectious disease outbreak	2 (.7)	8 (3)	19 (6)	81 (27)	108 (36)	85 (28)	3.81 (1.00)	.69

Note. Item phrase is, "I would respond to a/an ***event type*** resulting in numerous sick or injured patients if one were to occur within the next 12 months." Missing values indicate the number and percentage of participants who did not answer each item based on N = 303. Item scale is indicated, at the top and all items are shown as they were scored. Potential scores for each item ranged from 1 to 5. Scale mean for all four items = 16.43; SD = 3.2; α = .90.

PHE survey scales. The items that contributed to each TPB scale were summed to create the measured variables used for the additional analyses. The final instrument contained 31 items (see Table 4.19).

Table 4.19

Comparison of the A Priori and Final Items and Scales

Variables	A Priori Items Scale M(SD) and α	Final Items Scale M(SD) and α
Intention	7 Likert-type items 25.80 (4.84); α = .85	4 Likert-type items 16.43 (3.2); α = .90
Outcome Beliefs	8 Likert-type items 32.79 (2.68); α = .51	5 Likert-type items 23.76 (1.82); α = .85
Attitude	8 semantic differential items 19.03(3.77); α = .56	2 semantic differential items 8.74 (1.52); α = .78
Referent Beliefs	4 Likert-type items 15.78 (2.58); α = .79	4 Likert-type items 15.78 (2.58); α = .79
Subjective Norm	1 Likert-type item 4.02 (.75)	1 Likert-type item 4.02 (.75)
Control Beliefs	10 Likert-type items 40.98 (5.20); α = .87	10 Likert-type items 40.98 (5.20); α = .87
Perceived Behavioral Control	7 Likert-type and word pair items 28.32 (3.19); α = .69	5 Likert-type and word pair items 21.00 (2.56); α = .80

Note. The Likert-type and semantic differential items were based on the seven TPB constructs. Ratings ranged from 1 (*negative* belief or attitude toward PHE response) to 5 (*positive* belief or attitude toward PHE response). The original instrument contained 45 items; the final scales used for the following analyses contained 31, 5-point Likert-type and semantic differential items. *N* = 303.

Correlation among TPB-scales. Missing data are a part of most research and there are many ways of dealing with this issue. One method is to omit those cases with missing data, but this could lead to a loss of power. An older approach is to substitute the mean for the data, which can lead to an underestimate of error.

Even though replacing missing values with the scale mean for all cases is not considered the best approach, this was the method applied to the data before additional analyses were conducted. Missing values identified during the item response analyses accounted for less than 3% of the data (see Table 4.20).

Table 4.20

Summary of Missing Values

Item	Range *n* (%)
Intention	1 - 4 (.3 - 1.3)
Outcome Beliefs	0 - 5 (0 - 1.7)
Attitude	7 (2)
Referent Beliefs	1 - 2 (.3 - 1)
Subjective Norm	2 (.7)
Control Beliefs	0 - 3 (0 - 1)
Perceived Behavioral Control	0 - 3 (0 - 1)

Note. Both items that were included in the final attitude scale were missing 7 (2%) values. The single-item scale, subjective norm, was missing 2 (.7%) of the values. Visual inspection of the data did not identify any patterns or large gaps of missing data. Missing values were replaced with the scale mean for all cases. $N = 303$.

Pearson's correlations were used to measure linear associations between the each pair of the six TPB predictor variables and each predictor variable and the outcome variable, intention. The correlations between each pair of the seven variables are presented in Table 4.21. All correlations were statistically significant. Generally the correlations indicated strong positive associations with referent beliefs and subjective norm having the highest correlation ($r = .79$, $p < .001$) followed by a

large positive association (r =.61, p <.001) between control beliefs and perceived behavioral control. In sharp contrast, the measure of attitude had weaker associations (range r =.13, p <.05 to r =.28, p <.001) with the other predictor variables and the outcome variable.

Table 4.21

Summary of Correlations, Reliability Estimates, and Psychometric Properties of the Public Health Event Survey Scales

Variable	1.	2.	3.	4.	5.	6.	7.
1. Intention	-						
2. Outcome Beliefs	.364**	-					
3. Attitude	.125*	.177**	-				
4. Referent Beliefs	.395**	.370**	.253**	-			
5. Subjective Norm	.397**	.345**	.271**	.794**	-		
6. Control Beliefs	.395**	.455**	.234**	.457**	.448**	-	
7. Perceived Behavioral Control	.412**	.411**	.203**	.370**	.358**	.610**	-
Cronbach's α	.90	.85	.78	.79	-	.87	.80
n scale items	4	5	2	4	1	10	5
Possible range	4 - 20	5 - 25	2 - 10	4 - 20	1 - 5	10 - 50	1 - 25
M (*SD*)	16.4 (3.09)	23.8 (1.81)	8.74 (1.50)	15.8 (2.56)	4.02 (.74)	41.0 (5.14)	21.0 (2.55)
Skewness	-.76	-1.37	-1.49	-.07	-.52	-.15	-.28
Kurtosis	.52	.96	2.71	-.36	.21	-.15	-.15

Note. Scores on Likert-type and semantic differential items range from 1 (*unfavorable* belief or attitude toward PHE response) to 5 (*favorable* belief or attitude toward PHE response). N = 303. *Correlation is significant at the .05 level (2-tailed). **Correlation is significant at the .01 level (2-tailed).

Aim 2: Compare PHE Survey Responses of Nurses with Those of Other Health Care Personnel

Statistical assumptions. In order to generate valid conclusions from the data, there must be an adequate sample size and the data must fit with a normal distribution in order for certain statistical analyses (e.g., *t*-tests) to yield meaningful results. Therefore, a power analysis and three primary assumptions were tested prior to additional statistical analyses. A plausible significant difference between the groups was considered at a critical *p* value $\leq$ .05 (Lehmann, 1993).

A priori power estimate. An a priori estimate of required sample size was calculated for a two-tailed *t*-test, Type I error probability set at .05, and a power of .80. Results indicated a total sample of 128 was required to achieve these parameters (Faul, Erdfelder, Buchner, & Lang, 2009).

Assumption of normality. Three approaches to test for normality were used: probability-probability (P-P) plots were scanned for any deviations from the diagonal that might suggest non-normal distribution of the seven variables, skew and kurtosis were examined, and the distribution of the scaled data was statistically compared to a normal distribution to check for any significant differences (see Appendix D).

Table 4.22 shows the distributions of the seven TPB-based scales. Scores for the measure of outcome beliefs and attitude were notably skewed (-1.37 and -1.47 respectively) with the bulk of responses falling to the right of the mean. The attitude scale also had a greater than expected kurtosis (2.71). The other predictor variables and the outcome variable were also negatively skewed with less remarkable peaks.

In general, the data points fell close to the diagonals depicted in the P-P plots (see Appendix D) with the exception of the outcome beliefs scale.

Table 4.22

Summary of Scale Distributions

Variable	*M* (*SD*)	Skewness	Kurtosis
Intention	16.4 (3.2)	-.76	.52
Outcome Beliefs	23.8 (1.82)	-1.37	.96
Attitude	8.74 (1.52)	-1.47	2.71
Referent Beliefs	15.8 (2.58)	-.07	-.36
Subjective Norm	4.02 (.75)	-.52	.21
Control Beliefs	41.0 (5.20)	-.15	-.15
Perceived Behavioral Control	21.0 (2.56)	-.28	-.15

Note. Graphic representations of these data are shown in Appendix D. *N* = 303.

In order to test whether the distribution of scores in each of the seven scales deviates from a comparable normal distribution, a Mann-Whitney U-test and an independent samples Kolmogorov-Smirnov (K-S) test were computed. These test the hypothesis that the distribution of the six TPB predictor scales and the outcome variable are the same across RN and other HCP groups. Even though results of these tests were mixed for the perceived behavioral control scale (Mann-Whitney U p = .04, KS p = .33), the calculations suggested that the null hypotheses that the distribution is normal should not be rejected (see Table 4.23).

Table 4.23

Summary of Tests for the Assumption of Normality

Variable Scale	Mann-Whitney *U* *p*	Kolmogorov-Smirnov *p*
Outcome Beliefs	>.05	>.05
Attitude	>.05	>.05
Referent Beliefs	>.05	>.05
Subjective Norm	>.05	>.05
Control Beliefs	>.05	>.05
Perceived Behavioral Control	<.05	>.05
Intention	>.05	>.05

Note. Differences in sample size can result in the detection of small variances across groups that might produce a significant result. *N* = 303. Significance level is .05.

Homogeneity of variance. When different groups of participants are tested, in this case the nurse and the other HCP subgroups, the assumption is that each sample comes from a population with about the same variance. Levene's test was used to test the null hypothesis that the variances in the groups are not different. An non-significant result ($p > .05$) suggests the variances are relatively the same across groups and the assumption of homogeneity was tenable (see Table 4.24).

Table 4.24

Summary of Levene's Test

Variable Scale	*F*	*p*	Nurses *M* (*SD*)	Other HCP *M* (*SD*)
Outcome Beliefs	.03	.87	16.52 (3.0)	16.07 (3.42)
Attitude	.35	.56	23.79 (1.82)	23.67 (1.75)
Referent Beliefs	.00	.99	8.76 (1.47)	8.64 (1.57)
Subjective Norm	.01	.92	15.76 (2.57)	15.85 (2.55)
Control Beliefs	.07	.80	4.00 (.76)	4.10 (.68)
Perceived Behavioral Control	.11	.75	40.96 (5.19)	41.03 (4.94)
Intention	2.17	.14	21.14 (2.56)	20.43 (2.43)

Note. A *t*-test (two-tailed) was calculated to obtain the *F* and significance (*p*) statistics, which is included in SPSS output for *t*-tests. *Non*-significant *F* results indicated the variances were similar between the two groups (nurses and other HCP). In large samples, small differences in group variances can produce a significant Levene's test. *N* = 303. Table 4.25 shows the *M* (*SD*), mean difference, and CI for each group and variable.

Independence. The assumption of independence presumes that the errors associated with one observation are not correlated with the errors of any other observation in the sample. Because the data obtained for these analyses were collected from six different sites it is possible the data were independent, but participants within each site might have, in some way, influenced the data of other study participants at that site. To test this assumption, a Durbin-Watson statistic was computed using simple regression. The result (1.94) was considered acceptable suggesting the assumption of independence of errors was met.

Professional group comparison. In order to compare the responses of RNs and other HCP, a series of independent sample *t*-tests were used to test whether the

two groups mean scores on the seven TPB-based scales were significantly different. The assumptions needed to conduct these tests were met and the sample was divided into two subgroups: registered nurses (RN) and other HCP. To help visualize the distribution of responses of RNs and other HCP, back-to-back stem-and-leaf plots were created for each of the six TPB predictor variables and the outcome variable (see Appendix E). The responses of the RN group mirrored those of the other HCP group. The intention, referent belief, and attitude scales appeared bimodal for both groups. The intention and attitude scales were skewed to the right, but the distribution of the majority of responses for referent beliefs fell very close to the mean. Although the outcome beliefs scales appeared to be unimodal, both groups distribution of scores were noticeably to the right of the mean. The distributions of the subjective norm, control beliefs and perceived behavioral control scales appeared fairly normal in their distributions with the majority of responses falling close to the mean for both groups.

Findings of these nondirectional *t*-tests suggested that a possible difference between these groups was in how RNs (M = 21.14, SD = 2.56) seemed to have a more positive perception of behavior control compared to other HCP (M = 20.43, SD = 2.43), t (301) = 1.9, p = .05 (see Table 4.25).

Table 4.25

Comparing Nurses and Other HCP

Predictor Variables (Scale *M*)	Nurses *n* = 242 *M* (*SD*)	Other HCP *n* = 61 *M* (*SD*)	Mean Difference	95% CI	*t*(301)	*p*
Outcome Beliefs (*M* = 23.8)	23.79 (1.83)	23.67 (1.75)	.11	[-.40, .63]	.44	.66
Attitude (*M* =8.74)	8.76 (1.48)	8.64 (1.57)	.13	[-.30, .55]	.59	.56
Referent Beliefs (*M* = 15.8)	15.76 (2.57)	15.85 (2.55)	-.09	[-.82, .63]	-.25	.80
Subjective Norm (*M* = 4.02)	4.00 (.7)	4.10 (.68)	-.09	[-.30, .12]	-.89	.37
Control Beliefs (*M* = 41.0)	40.96 (5.19)	41.03 (4.94)	-.07	[-1.5, 1.4]	-.09	.92
Perceived Behavioral Control (*M* = 21.0)	21.14 (2.56)	20.43 (2.43)	.71	[.00, 1.4]	1.9	.05

Note. The six-predictor variables are scales derived from Likert-type and semantic differential items. Scores range from 1 (*negative* toward PHE response) to 5 (*positive* toward PHE response). The nominal type 1 error rate was set at .05, two-tailed.

A nondirectional *t*-test was also used to investigate if the RNs and other HCP differed in their intent to respond to a future PHE. The nominal type I error rate was set at < .05 and the critical value at which a plausible significant result was considered was set at $p \leq .05$, findings suggested that RNs and other HCP did not differ in their willingness to respond to a future PHE (see Table 4.26).

Table 4.26

Comparing Nurses and Other HCP Response Intention

Outcome Variable (*M*)	Nurses *n* =242 *M* (*SD*)	Other HCP *n* = 61 *M* (*SD*)	Mean Difference	95%CI	*t*(301)	*p*
Intention (*M* = 16.4)	16.5 (3.0)	16.1 (3.4)	.45	[-..41, 1.3]	1.02	.31

Note. Intention to respond to a future PHE is the target behavior and is measured using a scale comprised of 4 Likert-type items. Item scores ranged from 1 to 5. Scale α = .90. The nominal type 1 error rate was set at .05, two-tailed.

Because the type of a PHE has been suggested by a group of researchers (Smith, Burkle, & Archer, 2011) to affect the intention of HCP to respond to a PHE, a chi-squared test for independence was calculated for each type of event. Findings suggested that RNs and Other HCP did not differ in their intention to respond to any of the event types (see Table 4.27).

Table 4.27

Nurses and Other HCP Response Intention to Types of Events

Public Health Event	Group	1 Extremely Unlikely *n* (%)	2 *n* (%)	3 *n* (%)	4 *n* (%)	5 Extremely Likely *n* (%)	$X^2(5)$	*p*
severe weather	Nurses	1 (.4)	8 (3)	19 (8)	99 (41)	115 (48)	4.88	.43
	Others	0	4 (7)	9 (15)	21 (34)	27 (44)		
terrorist attack	Nurses	4 (2)	7 (3)	42 (17)	102 (42)	87(36)	10.8	.06
	Others	1 (2)	7 (12)	9 (15)	23 (38)	21 (34)		
natural disaster	Nurses	1 (.4)	5 (2)	17 (7)	105 (43)	114 (47)	6.37	.27
	Others	0	5 (8)	5 (8)	26 (43)	25 (41)		
infectious disease outbreak	Nurses	7 (3)	14 (6)	64 (27)	92 (38)	65 (27)	2.70	.75
	Others	1 (2)	5 (8)	17 (28)	18 (30)	20 (33)		

Note. Item phrase is, "I would respond to a/an ***event type*** resulting in numerous sick or injured patients if one were to occur within the next 12 months." Scale scores are indicated at the top of the table and potential scores ranged from 1 to 5. These four items make up the scale for intention. Type 1 error =.05, two-sided; *p* value of $\leq$ .05 for possible significance. Nurses (*n* = 242), Others (*n* = 61).

Aim 3: Estimate a Series of TPB-based Observed Variable Structural Equation Models for Prediction of Intent to Respond to a Future PHE

PHE survey data were entered into AMOS (SPSS, 2009), a computer program specifically designed to analyze covariance structures, this process is known as structural equation modeling (SEM). The goal of the modeling is to obtain estimates of the path coefficients and disturbances that minimize the discrepancy between the observed sample matrix and the population matrix implied by the model (Bollen, 1989).

The TPB-based PHE response model. The relationships posited by the TPB shown in Figure 2.2 were used as the initial path model for prediction of PHE response (see Figure 4.1).

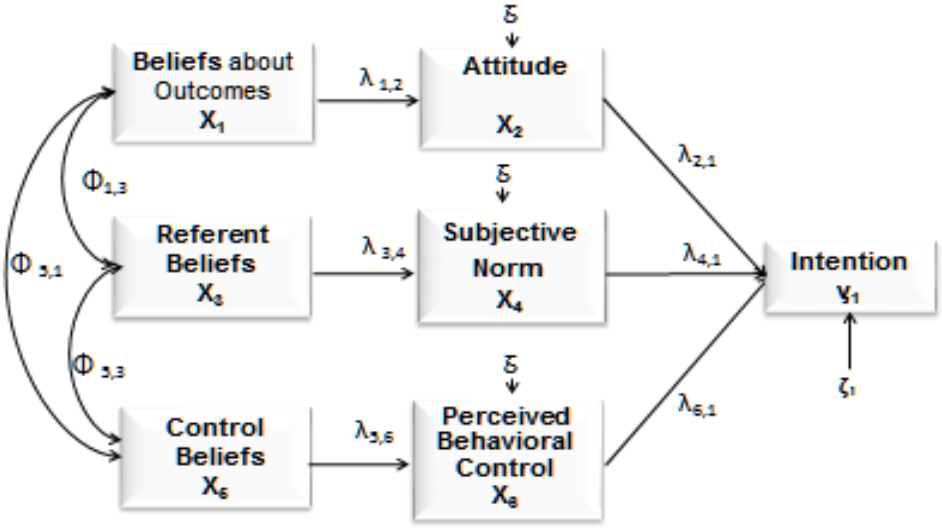


Figure 4.1. TPB-based PHE response model.

The rectangles (χ) designate the six measured predictor variables derived from the TPB-based PHE survey: beliefs about outcomes, attitude, referent beliefs, subjective norm, control beliefs, and perceived behavioral control. The outcome variable (ɣ), intention to respond to a future PHE, was also measured via the survey

instrument. The curved lines with double-headed arrows (Φ) show the correlations between the three observed belief variables (indirect predictors). Because this is an observed variable model that did not have any measurement structures imposed, the variables were assumed to be perfectly measured.

Approach to modeling. A model generating approach was used to develop and assess the models (Arbuckle, 2009). The first step was to postulate a tentative, theoretically defensible model (see Figure 4.1). The model was limited to TPB variables. Intention to respond was the sum of responses to each of the four types of PHE. Once the model parameters were specified, Mardia's normalized estimate of multivariate kurtosis was examined. A critical ratio of 9.07 indicated that there was a statistically significant degree of non-normality in the data (see Table 4.28)

Table 4.28

Assessment of Multivariate Normality (N = 303)

Variables	Minimum	Maximum	Skew	Kurtosis	Critical Ratio
Intention	4	20	.751	.490	1.742
Outcome Beliefs	16	25	-1.361	.927	3.295
Attitude	2	10	-1.490	2.859	10.158
Referent Belief	8	20	-.073	-.377	-1.388
Subjective Norm	2	5	-.522	.184	.653
Control Beliefs	24	50	-.144	-165	-.587
Perceived Behavioral Control	12	25	-.279	-.166	-.588
Multivariate				11.629	9.065

Note. Minimum and maximum values indicate the range of scores. Mardia's coefficient of multivariate kurtosis = 11.629. A critical ratio was obtained by dividing the sample coefficient by its standard error. A value greater than + 5.00 or less than - 5.00 indicate statistically significant degrees of non-normality (Byrne, 2010).

This non-normality could result in large X^2 estimates and large residuals that could lead to inappropriate modifications to the model (Byrne, 2010). In order to produce estimates that are less biased when the underlying distributions are not normal, a maximum likelihood bootstrap procedure was selected to estimate the TPB-based observed variable PHE response model (Sharma & Kim, 2012). The assumption of independence (e.g., no clustering of cases) must be met for bootstrap to work within the framework of covariance structure analysis.

Model fit was determined using the Likelihood Ratio Test (X^2) for evaluating whether the data fit with the model. A value greater than .05 indicated that there was no significant departure of the data between the unrestricted sample covariance matrix and the restricted covariance matrix ($\Sigma = \Sigma\Theta$). The Relative Fit Index (RFI; >.95), the Tucker-Lewis Index (TLI; > .95), and the root mean square error of approximation (RMSEA; <.05 with 90% confidence intervals) were also used to determine the fit of the data with the model. The Akaike Information Criterion (AIC) is a model selection criterion that provides meaningful information when models are specified a priori and compared. A model with a small AIC, compared to other models, and good fit values described above indicated a good fitting, parsimonious model.

Model interpretation. The initial postulated PHE response model (Figure 4.1) did not fit the data, X^2 (12, N = 303) = 56.168, p = <.001; RFI = .87; TLI = .89; RMSEA = .11, 90% CI [.08, .14]. Therefore, additional steps were taken to modify the model. The fit between the data and the modified model was determined by parameter values that were theoretically interpretable. Parameters that were constrained in the initial model were freely estimated in subsequent models, based on the modification index

(Lagrange Multiplier Test). The modification index gives the expected reduction in X^2 that would occur if the parameter was freely estimated. Modifications to the parameters were made one at a time in order to judge the impact of each modification on the disturbances. Modifications continued until the X^2 and model fit statistics indicated a fit between the data and the model that was theoretically interpretable with respect to the TPB.

The addition of a path between outcome beliefs and intention was the first modification made to the model (Model A) followed by the addition of a path from outcome beliefs to perceived behavioral control (Model B) and then another path was added from referent beliefs to attitude (Model C). The final modification was the addition of a path from control beliefs to subjective norm (Model D; see Table 4.29).

Table 4.29

Summary of Post Hoc Modifications to the PHE Model

Model	X^2	*df*	*p*	AIC	TLI	RFI	RMSEA	Modifications
TPB	56.168	12	.000	102.17	.89	.87	.110	Add OB → Intention
A	46.168	11	.000	94.17	.90	.88	.103	Add OB → PBC
B	35.11	10	.000	85.11	.93	.90	.091	Add RB → Attitude
C	22.164	9	.008	74.16	.96	.93	.070	Add CB → SN
D	14.70	8	.065	68.70	.98	.95	.053	

Note. During the post hoc model modification process, the Akaike Information Criterion (AIC) was used to assess absolute/predictive fit along with X^2 calculations, the Tucker-Lewis Index (TLI), the Relative Fit Index (RFI), and the root mean square error of approximation (RMSEA). A good fit of the data was indicated by the reduction of the AIC, a non-significant X^2, a TLI $\geq$ .95, a RFI $\geq$ .95, and an RMSEA $\leq$ .05. Arrows indicate paths. N = 303.

The data fit the final PHE response model pictured in Figure 4.2, X^2 (8, N = 303) = 14.70, p = .065; RFI = .95; TLI = .98; RMSEA = .053, 90% CI [.0, .094], AIC = 68.70. All parameter estimates were significant (p < .05) except for the relationships between outcome beliefs and attitude (b = .097, p = .105) and between attitude and intention (b = -.027, p = .600). Twenty-six percent of the variance in intention was explained by outcome beliefs, attitude, subjective norm, and perceived behavioral control leaving 74% of the variance unexplained. Sixty-four percent of the variance in subjective norm was explained by referent beliefs and control beliefs, which left 36% of the variance unexplained. Forty percent of the variance in perceived behavioral control was

explained by outcome beliefs and control beliefs, leaving 60% of the variance to be explained. Table 4.30 shows the standardized residual covariance matrix for the final PHE model shown in Figure 4.2. The residual matrix shows the differences between the sample variances and covariances and those predicted by the model.

Table 4.30

Standardized Residual Covariances for the Final PHE Model

Variables	1.	2.	3.	4.	5.	6.	7.
1. Intention	.099						
2. Outcome Beliefs	.087	.000					
3. Attitude	.720	.000	.000				
4. Referent Beliefs	.962	.000	.000	.000			
5. Subjective Norm	.301	.347	1.14	.000	.000		
6. Control Beliefs	.825	.000	1.57	.000	.000	.000	
7. Perceived Behavioral Control	.222	.000	1.67	1.05	1.80	.000	.000

Note. These standardized residual covariances have a standard normal distribution. If the data fit the model well, the standardized residuals should be less than 2 in absolute value.

The patterns of prediction were somewhat different from those posited by the TPB. The influence of outcome beliefs on intention appeared to split in three directions. The effect of outcome beliefs on intention appeared to be mediated by attitude (b = .097, p = .105) as well as perceived behavioral control (b = .17, p < .001). There also was a direct effect of outcome beliefs on intention (b = .18, p = .002). The referent beliefs measure was a significant predictor of subjective norm (b = .75,

$p < .001$) as theorized by the TPB. However, referent beliefs was also a significant predictor of attitude ($b = .22$, $p < .001$). The control beliefs measure was not only a significant predictor of perceived behavioral control ($b = .53$, $p < .001$) in accordance with the TPB, but also of subjective norm ($b = .11$, $p = .006$).

The correlation matrix (see Table 4.21) shows that the correlations between the three indirect predictors (outcome, referent and control beliefs) were all significant ($p < .01$). This information is shown (curved lines) in the final PHE response model.

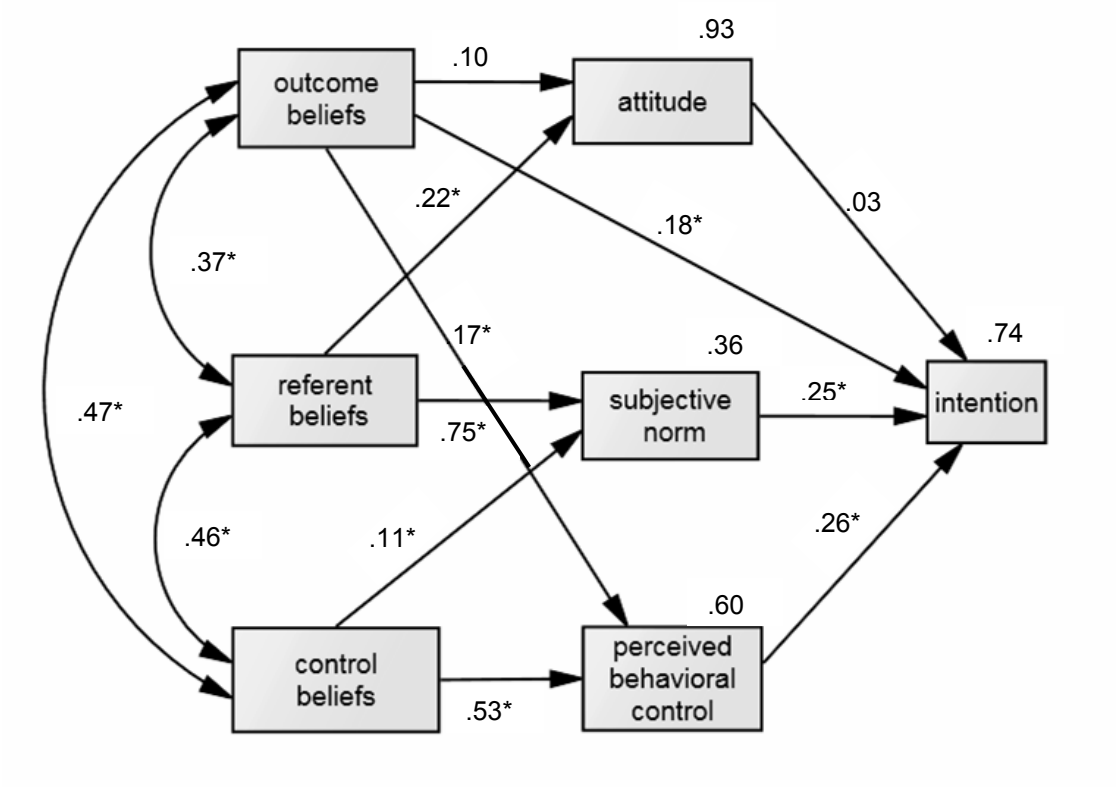


Figure 4.2. Final PHE response model. Standardized path coefficients between the observed variables are shown. The unexplained variance (1- R^2) for attitude subjective norm, perceived behavioral control and intention are displayed above the respective box. The correlations between the three belief scales (curved double-headed arrows) are shown: all correlations are significant (*p = .01 level (2-tailed). *Path parameter was significant at p <.05.

Mediation. The TPB postulates that the corresponding direct predictors, attitude (X_2), subjective norm (X_4), and perceived behavioral control (X_6) mediate the effect of each of their respective indirect predictors, outcome beliefs (X_1), referent beliefs (X_3), and control beliefs (X_5) on intention (y_1) (see Figure 4.1 and Figure 4.3). Using Baron and Kenny's (1986) four steps to establish mediation and the Sobel test to determine the significance of a mediation effect (Preacher & Leonardelli, 2010) the hypothesized mediation effects in the PHE response model were investigated (MacKinnon, 2008; MacKinnon, Fairchild, & Fritz, 2007). A preliminary exploratory analysis using simple regression was conducted prior to SEM analyses. Findings from the correlation matrix, linear regression, and the mediation effects tested using SEM are presented.

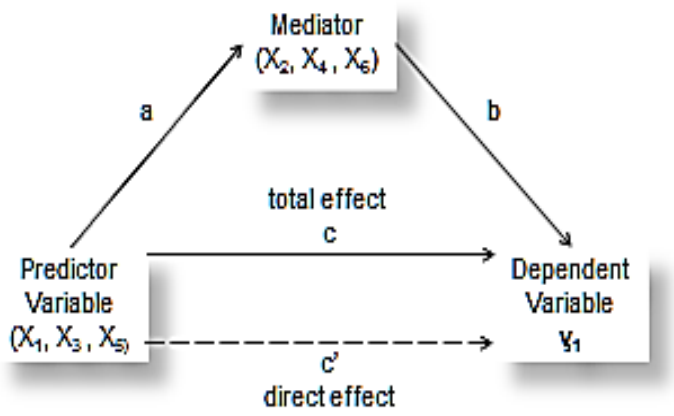


Figure 4.3. Condensed TPB-based six-predictor variable (X_n) model for PHE response intention (y_1) shown in Figure 4.1. Total effect (c) = direct effect (c') + indirect effect (ab).

Steps in mediation. Figure 4.3 helps to illustrate the steps outlined by Barron and Kenny (1986) to determine mediation effects. Using data obtained from the preliminary analyses, the first step established whether there is an effect of the indirect predictors (X_1, X_3, X_5) on intention. This is known as the total effect (path c). Indeed in the correlation matrix shown in Table 4.21, outcome beliefs (X_1) was significantly correlated with intention (r = .36, p <.01); referent beliefs (X_3) was also significantly correlated with intention (r = .40, p <.01); and control beliefs (X_5) was significantly correlated with intention (r = .40, p <.01). Results of this first step established that there was an effect that could be mediated (see Table 4.21).

The second step determined if the indirect predictors, outcome beliefs (X_1), referent beliefs (X_3), and control beliefs (X_5) are related to the potential mediators attitude (X_2), subjective norm (X_4), and perceived behavioral control (X_6) respectively (path a). Once again, Table 4.21 provided evidence that X_1 (outcome beliefs) was significantly associated with X_2 (attitude; r = .13, p =.05), albeit a small correlation. Referent beliefs (X_3) was highly correlated with X_4 (subjective norm; r = .79, p <.01), and X_5 (control beliefs) was significantly correlated with X_6 (perceived behavioral control; r = .61, p <.01). This established that the indirect predictors were associated with the direct predictors as posited by the TPB.

The third step, using regression analysis, illustrated that the mediators, attitude (X_2), subjective norm (X_4), and perceived behavioral control (X_6), exert an effect on the outcome variable, intention (path b) while controlling for the effect of X_1 (outcome beliefs), X_3 (referent beliefs), and X_5 (control beliefs) respectively. Estimates revealed that X_2 (attitude) did not have a significant effect on intention, b =

.06, t (301) = 1.14, p = .26. However, X_4 (subjective norm) did have a significant effect on intention, b = .23, t (301) = 2.61, p = .009. Likewise, X_6 (perceived behavioral control) had a significant effect on intention, b = .27, t (301) = 4.19, p < .001. These relationships are illustrated in Appendix F.

The fourth step (path c') established whether the relationship of the direct predictors, subjective norm (X_3) and perceived behavioral control (X_5), with intention were completely mediated by their respective indirect predictors, referent beliefs (X_4) and control beliefs (X_6). If the effect of the direct predictors on intention while controlling for the effect of the indirect predictors is zero, there is evidence of complete mediation. Neither subjective norm (X_3) nor perceived behavioral control (X_5) completely mediated the relationships. However, the standardized regression coefficient between subjective norm (X_3) and intention decreased when controlling for referent beliefs (X_4), b = .232, t (301) = 2.50, p = .013. Similarly, the standardized regression coefficient between perceived behavioral control (X_5) and intention decreased when controlling for control beliefs (X_6), b = .23, t (301) = 3.51, p = .001. Thus, the effects of subjective norm (X_3) and perceived behavioral control (X_5) on intention appeared to be mediated partially by referent beliefs (X_4) and control beliefs (X_6) respectively (see Table 4.31 and Appendix F).

Table 4.31

Summary of Model Mediation Effects in Standardized Beta Weights

	Standardized Total Effects				Standardized Direct Effects				Standardized Indirect Effects			
Variable	ATT	PBC	SN	INT	ATT	PBC	SN	INT	ATT	PBC	SN	INT
CB	0	.534	.107	0	0	.534*	.107*	0	0	0	0	.163*
RB	.127	0	.745	0	.217*	0	.745*	0	0	0	0	.182
OB	.80	.169	0	.178	.097	.169*	0	.178*	0	0	0	.041*
ATT	0	0	0	-.027	0	0	0	-0.27	0	0	0	0
PBC	0	0	0	.256	0	0	0	.256*	0	0	0	0
SN	0	0	0	.253	0	0	0	.253*	0	0	0	0

Note. The direct effects are the path coefficients shown in Figure 4.2. The amount of mediation (indirect effects) is computed as the product of both a and b. Total effect = direct effect + indirect effect. ATT = attitude, CB = control beliefs, RB = referent beliefs, OB = outcome beliefs, PBC = perceived behavioral control, SN = subjective norm, INT = intention. *$p < .05$.

Model interpretation. The concept of attitude did not significantly contribute to intention (path b) neither in the preliminary analysis nor in the final PHE response model in Figure 4.2. However, outcome beliefs (OB) did have a significant direct effect on intention (path c) and an indirect effect on intention that was mediated by perceived behavioral control (PBC) (new path a). Control beliefs (CB) appeared to influence intention through perceived behavioral control (PBC) as posited by the TPB but also unexpectedly through a new path to subjective norm (SN). SN mediated the relationship between referent beliefs (RB) and intention as theorized by the TPB but also mediated the relationship between CB and intention. Results of the Sobel test indicated that the effect of outcome beliefs on intention was significantly mediated by perceived behavioral control (z' = 2.02, p = .04) and that the influence of control beliefs on intention was significantly mediated by perceived behavioral control (z' = 3.67, $p < .001$)

Moderating effects. To determine if the PHE response path model shown in Figure 4.2 was consistent across different subsets of the sample, the sample was divided into subgroups based on professional affiliation: RN and other HCP. The model was limited to the observed TPB variables obtained in the PHE survey. Because the subgroups are actual levels of a possible moderator (e.g., professional affiliation), the goal of these analyses was to determine whether the mediational patterns, identified in the final PHE model, were moderated by the RN and other HCP subgroups of the sample. If the mediational patterns identified in the PHE model (see Figure 4.2) remained the same across the subgroups, but the magnitude of the

relationships between the variables changed, there was evidence of a moderating effect.

Pearson correlations for each group were calculated between each pair of predictor variables and between each predictor variable and the outcome variable (see Table 4.32). Referent beliefs and subjective norm had an extremely strong association in the groups, as did the correlations between control beliefs and perceived behavioral control. Of particular interest was the difference between the groups in the relationship of perceived behavioral control and intention: RN (r = .47, p < .001) and other HCP (r = .18, p >.05). The association of outcome beliefs and intention was also quite different between the groups: RN (r = .40, p < .001) and other HCP (r = .24, p > .05). The groups also differed in the correlations between referent beliefs and perceived behavioral control: RN (r = .41, p < .001) and other HCP (r = .22, p >.05).

Table 4.32

Correlations Comparing Nurses [a] (lower triangle) and Other HCP [b] (upper triangle)

Variable	1.	2.	3.	4.	5.	6.	7.
1. Intention	-	.242	.066	.472**	.485**	.444**	.183
2. Outcome Beliefs	.398**	-	.197	.310*	.338**	485**	.437**
3. Attitude	.140*	.171**	-	.258*	.235	.261	.222
4. Referent Beliefs	.376**	.385**	.252**	-	.774**	.319*	.223
5. Subjective Norm	.382**	.349**	.283**	.800**	-	.433**	.308*
6. Control Beliefs	.384**	.448**	.228**	.490**	.451**	-	.526**
7. Perceived Behavioral Control	.472**	.405**	.195**	.409**	.379**	.635**	-

Note. Scores on Likert-type and semantic differential items range from 1 (*unfavorable* belief or attitude toward PHE response) to 5 (f*avorable* belief or attitude toward PHE response). [a] RN subgroup sample size *n* = 242. [b] Other HCP subgroup sample size *n* = 61. *Correlation is significant at the .05 level (2-tailed). **Correlation is significant at the .01 level (2-tailed).

The initial TPB-based path model (see Figure 4.1) was used to begin the model generating analyses using simultaneous estimation of the RN and other groups. Model parameters were set equally for the two groups. The initial hypothesized model did not fit the data and post hoc modifications were made to parameters one at a time until an acceptable model fit was achieved. The graphic representations of inter-variable relationships identified through simultaneous modeling of the RN and other HCP groups were the same as those depicted in Figure 4.2, the final PHE model for all 303 participants combined. Appendix G shows the respective standardized path coefficients for the RN and other group. Comparison of the pairwise parameter calculations identified a significant path difference between

the two groups (Arbuckle, 2009). The relationship between subjective norm and intention in the RN group (b = .20, p <.05) was significantly different from the path estimates in the other HCP group (b =.46, p<.05) suggesting professional affiliation had a moderating effect on PHE response.

Incidental Findings

Several groups of researchers suggested that sex, team membership, education, and previous experience influenced the willingness of HCP to respond to a PHE (Chokshi, Behar, Nager, Dorey, & Upperman, 2008; Goodhue et al., 2011; Ko et al., 2004; Shapira et al., 1991). Measures of these factors were included in the PHE survey and their influence on the TPB constructs related to PHE response were evaluated using inter-correlation comparisons and nondirectional *t*-tests.

Sex. Males (n = 48) and females (n = 253) differed in their relationships between perceived behavioral control and intention (male r = .18, p >.05; female r = .45, p <.001) and between referent beliefs and outcome beliefs (male r = .25, p >.05; female r = .39, p <.001). Table H1 shows the correlations among the seven TPB variables for males and females (see Appendix H).

Nondirectional *t*-tests revealed that males (M = 16.55, SD = 2.27) differed from females (M = 15.66, SD = 2.58) in their evaluation of how specific individuals or groups who formed their social circles (i.e., referent beliefs) expected them to respond during a PHE, t (299) = 2.23, p = .03. There was no significant difference in intention scores between males and females (see Appendix H, Table H2).

Team membership. All the correlations related to intention were significant for those *without* team membership, but were not significant for those *with* team

membership. Correlations between outcome beliefs and perceived behavioral control were also interesting (Without $r = .36$, $p<.001$; With $r = .72$, $p < .001$). Table I1 shows the correlations between the seven TPB variables for those with response team membership and those without (see Appendix I).

A two-tailed *t*-test indicated that persons who belonged to an emergency response team had stronger control beliefs ($M = 43.0$, $SD = 4.82$) when compared with nonmembers ($M = 40.63$, $SD = 5.11$). This difference was significant, $t\ (301) = 2.90$, $p = .004$. There was no significant difference in intention scores between team members and non-members (see Appendix I, Table I2).

Public health event education. Subjective norm and referent beliefs had an extremely strong association in both the group with PHE education and those without PHE education. The correlations between perceived behavioral control and control beliefs were also large in both groups (see Appendix J, Table JI).

When those with PHE education were compared to those without PHE education, results of the non-directional *t*-tests suggested that these two groups differed significantly on three of the six TPB predictor variables (see Table 4.33).

Table 4.33

Comparing Those With and Without PHE Education

Predictor Variables (Scale *M*)	With Education *n* = 199 *M* (*SD*)	Without Education *n* = 102 *M* (*SD*)	Mean Difference	95% CI	*t*(299)	*p*
Intention (*M* = 16.4)	16.65 (3.04)	16.00 (3.13)	.66	[-.08, 1.39]	1.75	.08
Outcome Beliefs (*M* = 23.8)	23.90 (1.66)	23.48 (2.08)	.41	[-.02, .85]	1.88	.06
Attitude (*M* =8.74)	8.76 (1.49)	8.66 (1.53)	.10	[-.26, .46]	.55	.58
Referent Beliefs (*M* = 15.8)	15.97 (2.64)	15.37 (2.37)	.59	[-.01,1.21]	1.93	.06
Subjective Norm (*M* = 4.02)	4.1 (.76)	3.89 (.69)	.20	[.02, .38]	2.21	.03
Control Beliefs (*M* = 41.0)	42.02 (4.96)	38.94 (4.93)	3.08	[1.89, 4.27]	5.12	.000
Perceived Behavioral Control (*M* = 21.0)	21.28 (2.59)	20.43 (2.38)	.86	[.24, 1.45]	2.75	.006

Note. The six-predictor variables are scales derived from Likert-type and semantic differential items. Scores range from 1 to 5. The type 1 error rate set at .05, two-tailed; significant differences were considered plausible at $p \leq .05$.

Public health event experience. Differences between those HCP with actual PHE work experience and those without were seen in the magnitude of the correlations between the outcome belief measures and other variables in general. However, all of these correlations were statistically significant in both sub-groups (see

Appendix K). Differences were evident in the associations between attitude and intention (experienced $r = -.03$, $p > .05$; not experienced $r = .14$, $p < .05$) and between subjective norm and attitude (experienced $r = .18$, $p > .05$; not experienced $r = .28$, $p < .001$). The association between subjective norm and perceived behavioral control were also noticeable (experienced $r = .61$, $p < .001$; not experienced $r = .28$, $p < .001$). Table K1 shows the correlations between the seven TPB variables for those with actual PHE experience and those without any PHE experience (see Appendix K, Table K1).

When those with PHE experience were compared to those without actual response experience, results of the non-directional *t*-tests suggested that these two groups differed significantly on four of the six TPB predictor variables and the outcome variable, intention (see Table 4.34).

Table 4.34

Comparing Those With and Without PHE Experience

Predictor (*M*)	*With* *n* = 59 *M (SD)*	*Without* *n* = 244 *M (SD)*	Mean Difference	95%CI	*t* (301)	*p*
Intention (*M* = 16.4)	17.32 (2.90)	16.21 (3.09)	1.10	[.23, 1.98]	2.49	.01
Outcome Beliefs (*M* = 23.8)	23.66 (1.92)	23.79 (1.81)	-.13	[-.64, .39]	-.48	.63
Attitude (*M* = 8.74)	8.95 (1.29)	8.68 (1.54)	.27	[-.16, .70]	1.24	.22
Referent Beliefs (*M* = 15.8)	16.37 (2.41)	15.64 (2.58)	.74	[.01, 1.47]	1.99	.05
Subjective Norm (*M* = 4.02)	4.24 (.73)	3.97 (.74)	.27	[.06, .48]	2.49	.01
Control Beliefs (*M* = 41.0)	43.49 (4.62)	40.37 (5.06)	3.12	[1.69, 4.54]	4.31	<.01
Perceived Behavioral Control (*M* = 21.0)	21.66 (2.54)	20.84 (2.53)	.83	[.10, 1.55]	2.25	.03

Note. The six predictor variables are scaled Likert-type and semantic differential items based on the TPB. Scores range from 1 to 5. The nominal type 1 error rate was set at < .05, two-tailed; significant differences between the groups was considered plausible at $p \leq .05$.

Chapter V: Discussion of Findings

Sample

Although HCP work in a variety of settings, the six sites involved in this study were health care facilities. Therefore, it is not surprising that 75% of this sample worked in a hospital setting, which is greater than the 66% reported in the 2008 National Sample Survey of Registered Nurses (U.S. Department of Health and Human Services and Health Resources and Services Administration [U.S. DHHS, HRSA], 2010). Likewise, according to the 2009 National Pharmacists Workforce Survey (Midwest Pharmacy Workforce Research Consortium, 2010), 38% of the pharmacists worked in a hospital setting. However, 69% of the pharmacists who completed the PHE survey reported they were employed in a hospital setting. This resulted in an underrepresentation of community HCP, especially advanced practice nurses and independent pharmacists.

Generally, registered nurses (RNs) were overrepresented in the sample of HCP who participated in the PHE survey (see Tables 4.5 and 4.6). There were 15 nurses for every physician. This was noticeably over the national average of 10 nurses to every 3 physicians (Nursing, 2012). The U.S. DHHS, HRSA (2010) reported that males comprised 10% of the nursing workforce. In this sample, males represented just 8% of the workforce. Additionally, the average age of nurses who completed the instrument was slightly younger (44 years) than the national average of 46 years. The U.S DHHS and HRSA (2010) also highlighted the fact that "the racial and ethnic profile of the RN population is substantially different from that of the U. S. population" (pp. 7.5 – 7.10). In general, 90% of the nursing workforce was

Caucasian. Asian (2%), African American (3%) and Latino (1%) nurses were underrepresented in this sample compared to the data presented in the 2008 national RN survey where Asian, African American, and Latino nurses comprised 6%, 5%, and 4% of the U.S. registered nurse workforce respectively (U.S DHHS and HRSA , 2010).

In this sample of nurses (see Table 4.6), the number of Caucasian nurses with a Bachelor's (45%) and a Master's degree (7%) were above the reported number of Bachelor prepared nurses (37%) and below the number of reported Master prepared nurses (13%) who responded to the 2008 national RN survey (U.S DHHS, HRSA, 2010). In this sample 2% of Asians, 2% of African Americans, and <1% of Latino nurses were prepared at the bachelor's master's or doctoral levels. This fell well below the reported percentages for Asians (75%), African American (53%) and Latino (52%) nurses who had nursing-related bachelor's, master's or doctoral preparation (U.S. DHHS, HRSA, 2010).

Even though the U.S DHHS, HRSA Bureau of Health Professions (2008) reported physician workforce information by specific geographic regions, some national data was available. In that report, the mean age of the U.S. physician workforce was the same as the physicians in the sample (44 years). Seventy-four percent of the physician workforce was reported to be Caucasian. In this sample, 81% of the physicians reported they were Caucasian (see Table 4.5). Asian (6%), African American (6%) and Latino (0%) physicians were underrepresented in this sample compared to the data presented in the physician workforce document, Asian, African American, and Latino physicians comprised 13%, 4%, and 5% of the U.S.

physician workforce, respectively. The percentage of female physicians (38%) in this sample (see Table 4.5) was slightly greater than the 33% reported in the government document.

The sample of pharmacists participating in this survey did not parallel the findings reported in the National Pharmacy Workforce survey (Midwest Pharmacy Workforce Research Consortium, 2010). The report described the aging population of pharmacists with 78% being 46 years of age or older. The mean age for this sample was 36 years. Thirty-eight percent of the sample were female, whereas in the national survey 46% of the pharmacists were reported as female. The majority of pharmacists participating in the PHE survey were Caucasian, which echoed the findings of the workforce study. Less than one percent of the total number of pharmacists who responded to the workforce study were American Indian and 2% were Latino. No American Indian or Latino pharmacists participated in the PHE survey (see Table 4.5).

Aim 1: Evaluate Responses to the PHE Survey Including Psychometric Properties of the TPB-based Scales

Beliefs about outcomes. In general, the majority of participants scored these five items as either a 4 or 5 with the mean scores ranging from 4.72 to 4.82 (see Table 4.8). Because there was a large concentration of scores at or near the upper limit of the scale (ceiling effect) variance was limited. This might have affected the scale's association with the other independent variables and intention.

The three items that were removed from the final scale were phrased in the negative. This scale might be improved for the future measurement of this construct,

by rephrasing the three items in the positive and adding more items that include specific words or phrases relevant to the outcome of PHE experiences. The open comment sections of the PHE survey might provide appropriate words or phrases that could be used to strengthen this scale.

Previous research revealed that one of the most persuasive factors among health care workers was the perception that they were able to provide tangible help to victims of disasters and it was also their professional duty to respond to the needs of their patients during a PHE (Ives et al., 2009; Masterson, Steffen, Brin, Kordick, & Christos, 2009; Qureshi, Gershon, & Conde, 2008; Shaw, Chilcott, Hansen, & Winzenberg, 2006). Responses to a related outcome beliefs item showed that the majority of participants believed responding to a future PHE fulfilled their duty to care.

The majority of HCP who responded to the PHE survey believed their response to a PHE could result in positive outcomes (see Table 4.8). The behavior with the highest mean score was related to professional practice (i.e., “I will use my professional knowledge and skills to help others when responding as a health care professional to an event resulting in a large number of sick and injured.”). However, the item with the lowest mean score (i.e., “I will distribute resources in ways that prevent as much death and disability as possible when responding as a health care professional to an event resulting in a large number of sick and injured.”) involved factors not necessarily under the volitional control of the person. This suggested that intended response to a PHE was influenced by factors that were under both the volitional control of the individual (e.g., professional knowledge and skill) and outside the control of the individual (e.g., acquiring and distributing health care resources).

Attitude. Responses to the eight a priori semantic differential items measuring attitude toward PHE response were varied with mean scores ranging from 2.40 to 4.44. The largest number of missing values (7) was associated with the items measuring this construct. The two items that were included in the final scale were similar measures of generally positive attitude (i.e., good and beneficial) toward PHE response with the mean scores of 4.31 and 4.44 respectively (see Table 4.10).

The six items that were eventually eliminated from the study were a mix of social related attitudes (i.e., rewarding, good use of my time) and general instinctive attitudes (i.e., dangerous, frightening). Social bias can distort a person's true attitude toward a behavior that has social overtones, such as PHE response by HCP. Reponses might reflect symbolic attitude rather than true attitude toward the behavior. Additionally, general affective attitudes have not been shown to be a good predictor of behavior (Ajzen & Fishbein, 2005).

This might lead one to question the validity of the attitude measures that did not seem to provide a complete assessment of the attitude construct and failed to capture the person's true attitude toward PHE response. Instead of assessing an attitude related to the intent to respond to a specific PHE, these items might have actually assessed an affective component that measured the person's general attitude toward PHEs. Moreover, "if there is one clear conclusion to be derived from work on the attitude-behavior relation it is that general attitude will usually not provide a good basis for predicting and explaining single behaviors . . ."(Ajzen & Fishbein, 2005, p. 183).

The MODE (Motivation and Opportunity as DEterminants of the attitude behavior relation) model was used by Ajzen and Fishbein (2000, 2005) to help explain the processes by which attitude might or might not influence a specific behavior (see Appendix L). This model suggested those strong attitudes, which are a learned association between an object and an evaluation of that object, influences behavior. It is the person's perception of the object (e.g., a tornado, or H1N1) that shapes his or her definition of the event and the positive or negative values associated with performing a behavior related to the event. Thus, low attitude-behavior correlations imply that weak, or ambivalent, attitudes do not influence a person's definition of the event and therefore do not guide behavior. Given that the target behavior (PHE response) is not under complete volitional control and the cognitive capacity of this sample of HCP is high, it is possible responses to these semantic differential items reflected the lack of the items to stimulate the participants to define a situation related to a specific PHE adequately.

These attitude items might be improved by applying the principle of compatibility (Ajzen & Fishbein, 1977, 2005) whereby items measuring attitude are consistent with a specific target, context, and time. Using words or phrases from the narrative statements obtained in the open comment section of the PHE survey, the items could be reworked to parallel specific sentiments expressed by the participants.

Referent beliefs and subjective norm. Several groups of researchers reported that beliefs regarding personal and professional obligations entered into the willingness of HCP to respond to a PHE (Bensimon, Tracy, Bernstein, Shaul, & Upshur, 2007; Davidson et al., 2009; Mitani, Kuboyama, & Shirakawa, 2003; Smith,

2008; Smith, Morgans, Qureshi, Burkle, & Archer, 2009). Indeed, this research revealed that the role of referents was an important factor associated with the intent of HCP to respond to a PHE. The referents with the highest mean score (4.10) were colleagues, followed by boss (4.09), then friends (3.90), and finally closest family members (3.69). This suggested that this sample of HCP possessed a higher sense of obligation to the referents associated with their profession compared to the referents linked to their social and personal lives when considering responding to a future PHE (see Table 4.11). The correlation between referent beliefs and subjective norm was statistically significant and strong, which highlights the influence these normative factors have on the intention of HCP to respond to a future PHE (see Table 4.21).

An additional survey item asked the participants, "I believe the majority of my coworkers will come to work when a public health event occurs and results in a large number of sick and injured," which was rated on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Even though this item was not linked directly to the TPB, an analysis of this item indicated that 84% of the sample agreed that their coworkers were willing to respond to a PHE. This provides insight into the participants' beliefs regarding collegial behavior during a PHE (see Tables 4.12).

Control beliefs and perceived behavioral control. Generally, responses to the control belief and perceived behavioral control items were positive. The two control belief items with the highest mean scores focused on communication (see Table 4.14). Both interpersonal skills and team membership skills are within the volitional control of the individual and are important when working with referents,

clients and organizations during a PHE. Because some factors associated with PHE response are not under the volitional control of HCP, efforts to gain control over these factors seemed to include collaboration through communication with team members or colleagues.

Although the care environment was not directly measured in this study, the majority of survey respondents worked in a hospital or clinic setting. Researchers reported that when an individual belonged to a response team or had a role in PHE response they were more willing to respond (Balicer et al., 2010; Barnett, Thompson, et al., 2009; Chokshi, Behar, Nager, Dorey, & Upperman, 2008; Goodhue et al., 2011; Griffiths, Emrys, Finney Lamb, Eagar, & Smith, 2003; Gullion, 2004). Indeed, members of an emergency response team had stronger control beliefs than non-members (see Appendix I, Table I1 and I2).

Perceptions of efficacy were reported by several groups of researchers to play an important role in response willingness (Barnett, Thompson, et al., 2009; Goodhue et al., 2011; Gullion, 2004; Ko et al., 2004; Ma et al., 2011; Tippett et al., 2010; Watt et al., 2010; E. L. Wong et al., 2010). The two perceived behavioral control items with the highest mean scores reflected the participants' perceptions that it was possible to effectively respond to a PHE and provide appropriate care (see Table 4.16). However, responses to the two items with the lowest mean scores hinted that participants thought that obtaining resources needed for safe patient care could be out of their control. This distinction might suggest that during a PHE these HCP believed *appropriate* care could be delivered, but it might not meet the standards for

safe care that are expected during times when the health care system and access to the needed resources are not stressed by a PHE.

Intention. Though removed from the final intention scale, the item with the highest mean score of the original seven items indicated that the majority of HCP intended to respond to a PHE in their community (see Table 4.17). This suggested that there is a sense of obligation to the community when an event occurs.

The pattern of responses related to the willingness to respond to different types of PHEs corresponded to the literature (Smith, Burkle, & Archer, 2011; Smith et al., 2009). HCP were more likely to respond to familiar types of events than to human-made events that posed an increased risk or that could persist over an extended period (see Table 4.18). Responding to a natural disaster had the highest mean score (4.31), followed by a severe weather event (4.29), then terrorist attack (4.05), and finally an infectious disease event (3.81).

PHE survey. The PHE survey provided a systematic method for measuring the beliefs, attitude and perceptions of HCP about PHE response. Table 4.19 shows the 31 5-point Likert-type and semantic differential items that were used to create the one item measure of subjective norm and the six TPB-based composite scales that emerged with good measures of reliability (Cronbach's alphas ranged between .78 and .90).

The beginning patterns of the relationships among the theory's dimensions were seen in the correlation matrix (see Table 4.21). All six predictors were significantly correlated with the outcome variable, intention. As theorized by the TPB, there was a strong positive relationship between the indirect measure referent beliefs

and the direct measure of subjective norm. There was also a significantly positive relationship between control beliefs and perceived behavioral control. In contrast a weak, but significant, association between outcome beliefs and attitude emerged. Except for the weak association between beliefs about outcomes and attitude, these findings support the relationships posited by the TPB.

Aim 2: Compare PHE Survey Responses of Nurses with Those of Other Health Care Personnel

The mean intention scores of the nurses and other HCP did not differ and there were no significant differences between the two groups in their intention to respond to future severe weather events, natural disasters, terrorist events, or an infectious disease outbreak (see Table 4.27). However, there was a slight statistically significant difference between the responses of the nurses and those of the other HCP, nurses' perceptions of behavioral control were greater than the other HCP (see Table 4.25). This suggested that nurses considered themselves more likely to be able to care for patients effectively during a PHE than did the other HCP group.

The nurse and other HCP subgroups were very diverse, especially in terms of formal education, and there were likely as many differences within these groups with respect to the TPB variables as there were between the groups. Although the size of the other HCP was small, a secondary analysis examining the relationship between the level of education and the normative and control factors in the nurse and other HCP subgroups could reveal more information on the influence professional education has on PHE response intent as suggested by Barnett et al., (2009) and Gullion (2004).

Aim 3: Estimate a Series of TPB-based Observed Variable Structural Equation Models for Prediction of Intent to Respond to a Future PHE

The PHE response model. In the final TPB-based PHE response model that fit the data (see Table 4.29 and Figure 4.2), intention to respond was directly and significantly influenced by subjective norm, perceived behavioral control and, to a lesser extent, outcome beliefs. The paths between outcome beliefs and attitude and attitude and intention had small standardized betas that were not significant. The correlation between the measure of attitude and all other variables was also small (see Table 4.21). Because the attitude scale did not seem to measure the attitude construct adequately, it was not surprising that the pattern of prediction changed to include a statistically significant direct effect of outcome beliefs on intention.

Although Ajzen considers outcome beliefs to be an indirect measure of the attitude construct (Ajzen, 1987, 1991), he also implies that "volitional control is expected to moderate the intention-behavior relation" (Ajzen & Fishbein, 2005, p. 192). Interestingly, the responses to the items with the highest mean scores on the outcome beliefs scale were beliefs about behaviors that were under the control of the individual (see Table 4.8). This might clarify the statistically significant path between outcome beliefs and perceived behavioral control.

Subjective norm mediated not only the effect of referent beliefs on intention as posited by the TPB, but also mediated some of the effects of control beliefs on intention. Finally, perceived behavioral control not only mediated the effects of control beliefs on intention, as postulated by the TPB, but also mediated some of the effects of outcome beliefs on intention as well. Even though this model does not

appear to replicate the pathways postulated by the TPB, Ajzen and Fishbein (2005) noted that the exact nature of the relationships among the measures could vary as a function of the population and the target behavior.

Many of the patterns of relationships shown in the correlation matrix in Table 4.21 were similar to those identified in the PHE response model, especially the correlations between the pairs of the three indirect predictors (outcome, referent and control beliefs), the strong relationships between referent beliefs and subjective norm, and between control beliefs and perceived behavioral control. Attitude, however, did not appear to contribute to the prediction of PHE response intent. Ajzen and Fishbein (2005) noted ". . . one or another of the three predictors may be irrelevant and make no significant contribution to the prediction of intention." (p. 195).

Although subjective norm contributed to the prediction of intention to respond, perceived behavioral control exerted the greatest influence on intention. Perceived behavioral control was hypothesized by Ajzen (2002) to be a *superordinate* construct that contains measures of self-efficacy and controllability. This construct captures both internal and external factors that might be influenced by experiences and that, in turn, can influence a person's anticipation of behavioral outcomes or obstacles related to a behavior. This echoed the findings reported by Grimes and Medias (2010) and Ko et al. (2004) that perceived behavioral control exerted more influence than attitude and subjective norm on the intent of health care workers to volunteer to care for infected patients.

These findings suggested that the intention to respond was primarily influenced by normative and control factors. The item responses and the patterns of

relationships identified in the final PHE response model implied that this sample of HCP possessed and had control over a valuable set of skills and abilities that could be used to provide tangible help to victims of a PHE. Yet, some answers to individual items in the scales suggested that some participants were concerned that the access to resources could present an obstacle. This concern was one of the primary findings of a group of researchers who studied infection control intention and behavior among intensive care nurses (O'Boyle, Robertson, & Secor-Turner, 2006). However, many of the HCP endorsed control belief items indicating their perception that they had the interpersonal, team membership and leadership skills that could help them garner support from their referents and collaborate with organizations capable of providing the needed resources in order to bring about a positive outcome. The combination of these factors appeared to bolster the intent of HCP to respond to a future PHE.

Moderation. The intent to respond to a future PHE was discovered to be moderated by professional affiliation (see Appendix G). A significant difference between the PHE response models of the professional subgroups (nurses and other HCP) was observed in the effect subjective norm had on intention. In the other HCP subgroup, the intent to respond to a future PHE was mostly influenced by subjective norm. However, nurses' intent to respond was influenced primarily by perceived behavioral control, which was supported by the findings of the non-directional *t*-test (see Table 4.25). Additional insight into the differences between these groups in the normative and control factors that influence their intention to respond were reflected in the comparison of nurses and the other HCP correlations (see Table 4.32). This suggested that normative messages perceived by nurses regarding PHE response

were not as influential as they were for the other HCP group. In general, the willingness of nurses to respond was influenced mostly by the control factors whereas the other HCP group's intention to respond was shaped primarily by the normative factors.

Incidental Findings

Additional moderation effects related to sex, team membership, PHE education, and previous PHE experience might also exist based on the subgroup differences identified through the different *t*-test calculations. Further analyses could provide a better understanding of the influences these characteristics might exert on the prediction of intent.

Sex. Although males and females did not differ in their intention to respond to a future PHE, there was a slight statistically significant difference between the responses of the males and females. Males perceptions related to referent beliefs were greater than females (see Appendix H, Table H2). Both males and females had a strong significant correlation between referent beliefs and subjective norm, which suggested normative factors influenced both sexes' intent to respond.

Team membership. Even though team membership did not appear to make a difference in the intent to respond, it was not surprising that members of a PHE response team perceived greater control over the factors that influence the effectiveness of their response than their nonmember counterparts (see Appendix I, Table I2). Responses to control belief items suggested that having team membership and team leadership skills influenced the intent to respond (see Table 4.14). Additionally, the responses to the referent beliefs items suggested that referents

associated with the participants' profession might have a greater influence on the willingness of HCP to work during a PHE (see Table 4.11).

Both those with response team memberships and those who did not belong to a response team had statistically strong correlations between referent beliefs and subjective norm as well as control beliefs and perceived behavioral control. However, the two groups differed in their associations between outcome beliefs and intention. Team members showed a very weak non-significant association between outcome beliefs and intention, whereas those without team membership had a statistically significant correlation between outcome beliefs and intention.

PHE education. Even though neither knowledge nor the content included in the PHE education received by this sample of HCP was directly assessed, the comparison of the correlations of those with and without PHE related education showed an equally strong statistically significant relationship between referent beliefs and subjective norm as well as between control beliefs and perceived behavioral control in both groups (see Appendix J, Table J1). The rest of the correlations among the seven TPB variables were also similar in both groups.

In addition, the non-directional *t*-tests disclosed that those with PHE related education and those without did not differ significantly in their intention to respond. However, those with PHE education had higher mean scores on all seven TPB factors including outcome beliefs and the normative and control factors (see Table 4.33). This suggested that PHE education might be an important contributing factor to PHE response intent.

PHE experience. The proverb “experience makes the best teacher” might be reflected in the differences seen between those with actual PHE work experiences and those without. PHE experience appeared to substantially influence normative and control factors related to the intent of HCP to respond to future PHEs. Ajzen and Fishbein (2005, p. 195) suggested that the actual performance of a behavior could present new information about the possible outcomes of the behavior, the expectations of others, and control of factors. This new information can work backwards resulting in the formation of a new set of beliefs. Even though the strengths of the correlations between attitude, subjective norm, and perceived behavioral control vary with different target behaviors and populations, they can be based on the same information derived from the actual performance of the behavior. This feedback loop might possibly explain the control, normative, and behavioral intent differences between those with actual PHE experience and those without.

Comparison of the correlations showed a striking dissimilar relationship between the normative and control factors (see Appendix K, Table K1). Those who had not experienced a PHE had a smaller association between subjective norm and perceived behavioral control than did the group with actual PHE work experience. Additionally, all the correlations between attitude and the other variables were not significant in those with actual PHE experience, but in the group without PHE experience all the correlations were significant.

Chapter VI: Limitations and Recommendations

Limitations

Even though this study extended previous research on the intention of HCP to respond to a future PHE and echoed many of the conclusions of other groups of researchers, any generalizations about the relationships presented in the study should be interpreted cautiously as this study had several limitations.

The sample was a convenience sample of HCP. Nurses were anticipated to be the largest respondent group because they are also the largest group of employed health care personnel. However, physicians and pharmacists were under-represented as were HCP who worked in community or private practice settings. Minorities were also under-represented in this sample.

The context, in which this sample of HCP worked and lived, presumably influenced their self-reported responses to the PHE survey items. Information regarding regional and institutional variations in emergency response education and types of local PHEs was lacking, which could have influenced participant answers on the instrument. The size of some subgroups drawn from this sample for certain analyses were small; this could have decreased the power of the analyses and resulted in Type II errors.

Although most of the scales appeared to have adequate variability between participant responses to individual items and the scale created from each set of item, a ceiling or floor effect was possible. Distribution analyses showed that with the beliefs about outcome scales, there was a large concentration of participants' scores

near or at the upper limit (ceiling effect) (see Table 4.8 and Appendix D). This scale attenuation threatens the validity of the scale to measure the construct accurately.

Just two of the original eight items contributed to the final attitude scale that had adequate psychometric properties. Item and scale variability were adequate, but the scale score did not correlate well with the other TPB-based measures. This scale should not be used again in its current form.

Biases might have existed due to the retrospective cross-sectional design. The participants self-selected and provided data at a single point in time. It is not known how many eligible individuals who were aware of the study elected to not complete this online survey. Additionally participants received $20 remuneration for the time spent completing the survey, which might have resulted in sampling bias. Some participants may not have responded to the survey if remuneration was not offered. During the year preceding this study, several large natural disasters and the H1N1 pandemic occurred, which could have influenced some of the participants' responses.

Recommendations

Recommendations for practice. Even though the type, timing, and nature of PHEs are almost impossible to predict, healthcare administrators and educators can build on the professional qualities of their staff and bolster the normative and control factors that were discovered to be associated with the intention of HCP to respond to a future PHE. Realistic, well-timed education focused on internal (e.g., knowledge and skill), external (e.g., supplies and staff support), and normative factors relevant to the practical and ethical dilemmas related to surges in patients can help HCP

navigate a possibly difficult transition between a robust system to one of austerity and back again.

Bolstering teamwork through simulated events that replicate potential PHEs might increase HCP's perceptions of controllability, a sense of collegial support, and confidence in their organization. These control and normative factors were associated with the intention of HCP to respond to a future PHE.

Another aspect associated with patient care during a PHE is the preparation and education of the medically vulnerable patient (e.g., elderly, disabled, pregnant women, infants, and dialysis patients). HCP can lessen the detrimental effects of PHEs on the medically vulnerable by equipping patients and their families with the tools they need to maintain their well-being during and following a PHE. As promoters of health, HCP can provide their clients with realistic perspectives of the impact certain PHEs could have on their health, which may help them and their families prepare for and effectively meet their health needs during a PHE. This may include providing clients with information about health care services in the surrounding communities (e.g. dialysis, oxygen equipment) or even the establishment of support agreements with different organizations that could step in and meet a client's health care needs during a PHE.

HCP are also ambassadors for health and thus are community role models for public health initiatives such as immunizations. Providing accurate information to community members and their families about maintaining one's health during a PHE could promote community preparation in general.

Recommendations for future research. Several additional analyses of both the quantitative data and the qualitative data obtained in the PHE survey could be used to strengthen the measures as well as provide additional insights into the factors that influence PHE response. A secondary analysis of the RN group might provide additional insight on the possible moderating effect of levels of education on PHE response. The comments provided by the participants to the open-ended items could be used to create new items for the measurement of the attitude construct as well as revise the items that measure outcome beliefs. Having both positive and negative statements might have contributed to the lack of fit of the negatively worded items.

These additional findings could lead to the creation and pilot testing of additional studies that focus on possible client outcomes related to PHEs (e.g., I will be able to reduce morbidity for the high-risk pregnant woman affected by a PHE). Such a study could expand the understanding of the internal and external factors that influence not only PHE response, but also client support by health care practitioners such as veterinarians, pharmacists, school nurses and home health/hospice nurses. This line of study could include the use of new technologies (e.g., telehealth, remote monitoring) that can provide long-distance care to affected populations.

Research into the economics of PHE response can provide insight into the association between health care workers' unions (e.g., sanitary workers, security, nurses) and their policies regarding work intensity/compensation during PHEs. A mixed-method study focused on client care and support at long-term care or assisted living facilities could explore the impact a PHE could impose on the support staff, the professional staff, and the resident.

PHEs will continue to impact communities and vulnerable populations will continue to experience the emotional and physical effects of PHEs. The demand for health care services during PHEs will continue to challenge health care systems, HCP, and the medically vulnerable population.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Bechman (Eds.), *Action-control: From cognition to behavior* (pp. 11-39). Heidelberg, Germany: Springer.

Ajzen, I. (1987). Attitudes, traits, and actions: Dispositional prediction of behavior in personality and social psychology. In L. Berkowitz (Ed.), *Advances in Experimental Social Psycology* (pp.1-63). New York, NY: Academic Press.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology, 32*, 665-683. doi: 10.1111/j.1559-1816.2002.tb00236.x

Ajzen, I. (2011). The theory of planned behavior: Reactions and reflections. *Psychology and Health, 26*, 1113-1127. doi: 10.1080/08870446.2011.613995

Ajzen, I. (2013a). Attitude toward behavior. Retrieved from http://people.umass.edu/aizen/att.html

Ajzen, I. (2013b). Subjective norm. Retrieved from http://people.umass.edu/aizen/sn.html

Ajzen, I. (2013c). Perceived behavioral control. Retrieved from http://people.umass.edu/aizen/pbc.html

Ajzen, I. (2013d). Theory of planned behavior. Retrieved from http//people.umass.edu/aizen/tpb.diag.html

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin, 84*(5), 888-918.

Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. *European Review of Social Psychology, 11*, 1-33. doi: 10.1080/14792779943000116

Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracin, B. T. Johnson & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 173-221). Mahwah, NJ: Erlbaum. Retrieved from http://www.bm.ust.hk/~mark790b/readings/T5bR2_ajzen2005.pdf

Ajzen, I., & Manstead, A. S. R. (2007). Changing health-related behaviors: An approach based on the theory of planned behavior. In K. V. D. Bos, M. Hewstone, J. D. Wit, H. Schut & M. Stroebe (Eds.), *The scope of social psychology: Theory and applications* (pp. 43-63). New York, NY: Psychology Press.

Alexander, G. C., & Wynia, M. K. (2003). Ready and willing? Physicians' sense of preparedness for bioterrorism. *Health Affairs 22*, 189-197. doi: 10.1377/hlthaff.22.5.189

Arbuckle, J. (2009). *Amos 18 user's guide.* Chicago,IL: SPSS Inc.

Balicer, R. D., Thompson, C. B., Hsu, E. B., Catlett, C. L., Watson, C. M., Semon, N. L., . . . Links, J. M. (2010). Characterizing hospital workers' willingness to report to duty in an influenza pandemic through threat-and efficacy-based assessment. *BMC Public Health, 10*, 436-446. doi:10.1186/1471-2458-10-436

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Barnett, D. J., Balicer, R. D., Thompson, C. B., Storey, J. D., Omer, S. B., Semon, N. L., . . . Links, J. M. (2009). Assessment of local public health workers' willingness to respond to pandemic influenza through application of the extended parallel process model. *PLoS One, 4*, e6365. doi: 10.1371/journal.pone.0006365

Barnett, D. J., Levine, R., Thompson, C. B., Wijetunge, G. U., Oliver, A. L., Bentley, M. A., . . . Balicer, R. D. (2010). Gauging US emergency medical services workers' willingness to respond to pandemic influenza using a threat-and efficacy-based assessment framework. *PLoS ONE 5*, e9856. . doi:10.1371/journal.pone.0009856

Barnett, D. J., Thompson, C. B., Storey, J. D., Omer, S. B., Semon, N. L., Bayer, S., . . . Links, J. M. (2009). Assessment of local public health workers willingness to respond to pandemic influenza through application of the extended parallel process model. *PLoS ONE, 4*, e6365. doi: 10.1371/journal.pone.0006365

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Basta, N. E., Edwards, S. E., & Schulte, J. (2009). Assessing public health department employees' willingness to report to work during an influenza

pandemic. *Journal of Public Health Management and Practice, 15*, 375-383. doi: 10.1097/PHH.0b013e3181a391e200124784-200909000-00002 [pii]

Bensimon, C. M., Tracy, C. S., Bernstein, M., Shaul, R. Z., & Upshur, R. E. (2007). A qualitative study of the duty to care in communicable disease outbreaks. *Social Science and Medicine, 65*, 2566-2575. doi: S0277-9536(07)00411-X [pii]10.1016/j.socscimed.2007.07.017

Bollen, K. (1989). *Structural equations with latent variables*. New York, NY: Wiley & Sons.

Byrne, B. M. (2010). *Structural equation modeling with AMOS* (2nd ed.). New York, NY: Routledge.

Chaffee, M. (2009). Willingness of health care personnel to work in a disaster: an integrative review of the literature. *Disaster Medicine and Public Health Preparedness, 3*, 42-56. doi: 10.1097/DMP.0b013e31818e8934

Chiang, H. H., Chen, M. B., & Sue, I. L. (2007). Self-state of nurses in caring for SARS survivors. *Nursing Ethics, 14*(1), 18-26.

Chokshi, N. K., Behar, S., Nager, A. L., Dorey, F., & Upperman, J. S. (2008). Disaster management among pediatric surgeons. *American Journal of Disaster Medicine, 3*(1), 5-14.

Chong, M. Y., Wang, W. C., Hsieh, W. C., Lee, C. Y., Chiu, N. M., Yeh, W. C., . . . Chen, C. L. (2004). Psychological impact of severe acute respiratory syndrome on health workers in a tertiary hospital. *British Journal of Psychiatry, 185*, 127-133. doi: 10.1192/bjp.185.2.127185/2/127 [pii]

Cone, D. C., & Cummings, G. A. (2006). Hospital disaster staffing: If you call, will they come? *American Journal of Disaster Medicine, 1*(1), 28-36.

Cookson, S. T., Soetebier, K., Murray, E. L., Fajardo, G. C., Hanzlick, R., Cowell, A., & Drenzek, C. (2008). Internet-based morbidity and mortality surveillance among hurricane Katrina evacuees in Georgia. *Preventing Chronic Disease, 5* (4), A133. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2578770/

Cowan, A. E., Ching, P. L. Y. H., Clark, S. J., & Kemper, A. R. (2005). Willingness of private physicians to be involved in smallpox preparedness and response activities. *Biosecurity and Bioterrorism 3*, 16-22. doi:10.1089/bsp.2005.3.16

Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. Orlando, FL: Hold, Rinehart and Winston.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297 - 334.

Cronbach, L. J., & Shavelson, R. J. (2004). My current thoughts on coefficient alpha and successor procedures. *Educational and Psychological Measurement, 64*, 391-418. doi: 10.1177/0013164404266386

Damery, S., Draper, H., Wilson, S., Greenfield, S., Ives, J., Parry, J., . . . Sorell, T. (2010). Healthcare workers' perceptions of the duty to work during an influenza pandemic. *Journal of Medical Ethics, 36*, 12-18. doi: 36/1/12 [pii]10.1136/jme.2009.032821

Davidson, J. E., Sekayan, A., Agan, D., Good, L., Shaw, D., & Smilde, R. (2009). Disaster dilemma: Factors affecting decision to come to work during a natural

disaster. *Advanced Emergency Nursing Journal, 31*, 248-257. doi: 10.1097/TME.0b013e3181af686d01261775-200907000-00010 [pii]

DeSimone, C. L. (2009). Response of public health workers to various emergencies. *Workplace Health & Safety, 57*(1), 17-23.

DeVellis, R. F. (2003). *Scale development: Theory and applications* (2nd ed.). London, UK: Sage.

Dimaggio, C., Markenson, D., G., L., & Redlener, I. (2005). The willingness of U.S. Emergency Medical Technicians to respond to terrorist incidents. *Biosecurity and Bioterrorism, 3*, 331-337. doi: 10.1089/bsp.2005.3.331

Duckett, L., Henly, S., Avery, M., Potter, S., Hills-Bonczyk, S., Hulden, R., & Savik, K. (1998). A theory of planned behavior-based structural model for breast-feeding. *Nursing Research, 47*(6), 325-336.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160. doi:10.3758/BRM.41.4.1149

Fazio, R. H. (1995). Attitudes as object-evaluation associations: Determinants, consequences, and correlates of attitude accessibility. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences* (pp. 247-282). Hillsdale, NJ: Erlbaum.

Federal Emergency Management Agency (FEMA). (2011). Why define disaster? Retrieved from http://training.fema.gov/EMIWeb/edu/docs/hazdem/Session%206–Defining%20Disaster%20Slides.ppt

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Los Angeles, CA: Sage.

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach.* New York, NY: Psychology Press.

Flesch, R. (1948). A new readability yardstick. *The Journal of Applied Psychology, 32*(3), 221-233.

Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., . . . Bonetti, D. (2004). Constructing questionnaires based on the theory of planned behaviour: A manual for health service researchers. Newcastle: Centre for Health Services Research. Retrieved from www.bangor.ac.uk/~pes004/exercise_psych/.../tpb_manual.pdf

Francis, J. J., Johnston, M., Eccles, M. P., Grimshaw, J., & Kaner, E. F. S. (2004). Measurement issues in the theory of planned behaviour: A supplement to the manual for constructing questionnaires based on the theory of planned behaviour. 43-76. Retrieved from http://www.rebeqi.org/ViewFile.aspx?itemID=219

French, E. D., Sole, M. L., & Byers, J. F. (2002). A comparison of nurses' needs/concerns and hospital disaster plans following Florida's Hurricane Floyd. *Journal of Emergency Nursing, 28*, 111-117. doi: S009917670240431X [pii]

Garrett, A. L., Park, Y. S., & Redlener, I. (2009). Mitigating absenteeism in hospital workers during a pandemic. *Disaster Medicine and Public Health Preparedness, 3 Suppl 2*, S141- S147. doi: 10.1097/DMP.0b013e3181c12959

Gershon, R. R., Magda, L. A., Qureshi, K. A., Riley, H. E., Scanlon, E., Carney, M. T., . . . Sherman, M. F. (2010). Factors associated with the ability and willingness

of essential workers to report to duty during a pandemic. *Journal of Occupational and Environmental Medicine, 52*, 995-1003. doi: 10.1097/JOM.0b013e3181f43872

Goodhue, C. J., Burke, R. V., Ferrer, R. R., Chokshi, N. K., Dorey, F., & Upperman, J. S. (2011). Willingness to respond in a disaster: A pediatric nurse practitioner national survey. *Journal of Pediatric Health Care, 26*, 7-20. doi:10.1016/j.pedhc.2010.11.003

Griffiths, R., Emrys, E., Finney Lamb, C., Eagar, S., & Smith, M. (2003). Operation Safe Haven: The needs of nurses caring for refugees. *International Journal of Nursing Practice, 9*, 183-190. doi: 10.1046/j.1440-172X.2003.00422.x

Grimes, D. E., & Mendias, E. P. (2010). Nurses' intentions to respond to bioterrorism and other infectious disease emergencies. *Nursing Outlook, 58*, 10-16. doi: S0029-6554(09)00120-1 [pii]10.1016/j.outlook.2009.07.002

Guha-Sapir, D., Hargitt, D., & Hoyois, P. (2004). Thirty years of natural disasters 1974-2003: The numbers (2004). *Natural News*. Retrieved from http://www.em-dat.net/documents/Publication/publication_2004_emdat.pdf

Gullion, J. S. (2004). School nurses as volunteers in a bioterrorism event. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science, 2*, 112-117. doi:10.1089/153871304323146414

Gutierrez, D. (2008). Natural disasters up more than 400 percent in two decades, *Natural News*. Retrieved from http://www.naturalnews.com/023362.html#ixzz1wg0LcVpX

Hsu, M.-H., & Kuo, F.-Y. (2003). An investigation of volitional control in information ethics. *Behaviour and Information Technology, 22*, 53-62. doi: 10.1080/0144929021000036577

Imai, H., Matsuishi, K., Ito, A., Mouri, K., Kitamura, N., Akimoto, K., . . . Mita, T. (2010). Factors that reduce the conflicts of health professionals about working during a public crisis: A cross sectional study of motivation and hesitation of hospital workers in Japan during the pandemic (H1N1) 2009. *BMC Public Health 10*, 672-680. doi: 10.1186/1471-2458-10-672

Irvin, C. B., Cindrich, L., Patterson, W., & Slouthall, A. (2008). Survey of hospital healthcare personnel response during a potential Avian Influenza pandemic: Will they come to work? *Prehospital and Disaster Medicine, 23*, 328-335. doi: http://dx.doi.org/10.1017/S1049023X00005963

Ives, J., Greenfield, S., Parry, J. M., Draper, H., Gratus, C., Petts, J. I., . . . Wilson, S. (2009). Healthcare workers' attitudes to working during pandemic influenza: A qualitative study. *BMC Public Health, 9*, 56. doi: 1471-2458-9-56 [pii]10.1186/1471-2458-9-56

Katz, A. R., Nekorchuk, D. M., Holck, P. S., Hendrickson, L. A., Imrie, A. A., & Effler, P. V. (2006a). Bioterrorism preparedness survey of Hawaii mental health professionals. *International Journal of Mental Health, 35*, 12-25. doi: 10.2753/IMH0020-7411350101

Katz, A. R., Nekorchuk, D. M., Holck, P. S., Hendrickson, L. A., Imrie, A. A., & Effler, P. V. (2006b). Dentists' preparedness for responding to bioterrorism: A survey

of Hawaii dentists. *Journal of the American Dental Association, 137*(4), 461-467. Retrieved from http://www.jada.info/content/137/4/461.short

Ko, N. Y., Feng, M. C., Chiu, D. Y., Wu, M. H., Feng, J. Y., & Pan, S. M. (2004). Applying theory of planned behavior to predict nurses' intention and volunteering to care for SARS patients in southern Taiwan. *Kaohsiung Journal of Medical Science, 20*, 389-398. doi: S1607-551X(09)70175-5 [pii]10.1016/S1607-551X(09)70175-5

Koh, D., Lim, M. K., Chia, S. E., Ko, S. M., Qian, F., Ng, V., . . . Fone, C. (2005). Risk perception and impact of Severe Acute Respiratory Syndrome (SARS) on work and personal lives of healthcare workers in Singapore: What can we learn?. *Medical Care, 43*(7), 676-682. Retrieved from http://journals.lww.com/lww-medicalcare/Abstract/2005/07000/Risk_Perception_and_Impact_of_Severe_Acute.6.aspx

Lanzilotti, S. S., Galanis, D., Leoni, N., & Craig, B. (2002). Hawaii medical professionals' assessment. *Hawaii Medical Journal, 61*(8), 162-173.

Lehmann, E. L. (1993). The Fisher, Neyman-Pearson Theories of Testing Hypotheses: One Theory or Two? *Journal of the American Statistical Association, 88*, 1242-1249. doi: 10.2307/2291263

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research, 35*(6), 382-385.

Ma, X., He, Z., Wang, Y., Jiang, L., Xu, Y., Qian, C., . . . Du, B. (2011). Knowledge and attitudes of healthcare workers in Chinese intensive care units regarding

2009 H1N1 influenza pandemic. *BMC Infectious Diseases 11*, 24-31. doi: 10.1186/1471-2334-11-24

MacKinnon, D. P. (2008). *Introduction to statistical mediation analysis*. New York, NY: Taylor & Francis Group.

MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology, 58*, 593-614. doi: 10.1146/annurev.psych.58.110405.085542

Mackler, N., Wilkerson, W., & Cinti, S. (2007). Will first-responders show up for work during a pandemic? Lessons from a smallpox vaccination survey of paramedics. *Disaster Management & Response 5*, 45-48. doi:10.1016/j.dmr.2007.02.002

Martin, S. D. (2011). Nurses' ability and willingness to work during pandemic flu. *Journal of Nursing Management, 19*, 98-108. doi: 10.1111/j.1365-2834.2010.01190.x

Masterson, L., Steffen, C., Brin, M., Kordick, M. F., & Christos, S. (2009). Willingness to respond: Of emergency department personnel and their predicted participation in mass casualty terrorist events. *The Journal of Emergency Medicine 36*, 43-49. doi: 10.1016/j.jemermed.2007.10.074

Midwest Pharmacy Workforce Research Consortium. (2010). *2009 national pharmacist workforce survey: Executive summary*. Retrieved from http://www.pharmacy.wsu.edu/facultystaff/files/2009.pharmacist.workforce.survey.pdf.

Miller, P. (2012). Weather gone wild. *National Geographic, 222,* 30-55.

Mitani, S., Kuboyama, K., & Shirakawa, T. (2003). Nursing in sudden-onset disasters: Factors and information that affect participation. *Prehospital and Disaster Medicine 18*, 359 - 366. doi: http://dx.doi.org/10.1017/S1049023X00001321

Truth about Nursing. (2012). *How many nurses are there? And other facts.* Retrieved, from http://www.truthaboutnursing.org/faq/rn_facts.html

O'Boyle, C. (1998). *Variables that influence health care workers' adherence to recommended handwashing practices.* (Doctoral dissertation 9903364), University of Minnesota, Minneapolis. Retrieved from http://conservancy.umn.edu/handle/45272

O'Boyle, C., Henly, S. J., & Duckett, L. (2001). Nurse's motivation to wash their hands: A standardized measurement approach. *Applied Nursing Research, 14*, 136-145. doi:10.1053/apnr.2001.24412

O'Boyle, C., Robertson, C., & Secor-Turner, M. (2006). Nurses' beliefs about public health emergencies: Fear of abandonment. *American Journal of Infection Control, 34*, 351-357. doi: S0196-6553(06)00210-0 [pii]10.1016/j.ajic.2006.01.012

Polit, D. F., & Beck, C. T. (2008). *Nursing research* (8th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Preacher, K., J., & Leonardelli, G. J. (2010). Calculation for the Sobel Test Retrieved, from http://quantpsy.org/sobel/sobel.htm

Qureshi, K., Gershon, R. R., & Conde, F. (2008). Factors that influence medical reserve corps recruitment. *Prehospital and Disaster Medicine, 23*(3), s27-s34.

Qureshi, K., Gershon, R. R., Sherman, M. F., Straub, T., Gebbie, E., McCollum, M., . . . Morse, S. S. (2005). Health care workers' ability and willingness to report to duty during catastrophic disasters. *Journal of Urban Health, 82*, 378-388. doi: jti086 [pii]10.1093/jurban/jti086

Rand. (2011). *The public health system a decade after 9/11: Key success and continuing challenges*. Retrieved from http://www.rand.org/pubs/research_briefs /RB9608.html

Scott, T. E., Bansal, S., & Mascarenhas, A. K. (2008). Willingness of New England dental professionals to provide assistance during a bioterrorism event. *Biosecurity and Bioterrorism, 6*, 253-260. doi: 10.1089/bsp.2008.0014

Shapira, Y., Marganitt, b., Roziner, I., Shochet, T., Bar, Y., & Shemer, J. (1991). Willingness of staff to report to their hospital duties following an unconventional missile attack: A state-wide survey. *Israel Journal of Medical Sciences, 27*(11-12), 704-711.

Sharma, P. N., & Kim, K. H. (2012). A comparison of PLS and ML bootstrapping techniques in SEM: A Monte Carlo study. Retrieved from http://pitt.edu/~pns9/Sharma%20and%20Kim.pdf

Shaw, K. A., Chilcott, A., Hansen, E., & Winzenberg, T. (2006). The GP's response to pandemic influenza: A qualitative study. *Family Practice, 23*, 267-272. doi: cml014 [pii]10.1093/fampra/cml014

Sidani, S., & Braden, C. J. (1998). *Evaluating nursing interventions. A theory-driven approach*. Thousand Oaks, CA: Sage.

Smith, E. (2007). Emergency health care workers' willingness to work during major emergencies and disasters. *The Australian Journal of Emergency Management, 22*(2), 21-24.

Smith, E. (2008). Willingness to work during a terrorist attack: A case-study of first responders during the 9/11 World Trade Centre terrorist attacks. *Journal of Emergency Primary Health Care, 6*(1), 1-11.

Smith, E., Burkle, F. M., Jr., & Archer, F. L. (2011). Fear, familiarity, and the perception of risk: A quantitative analysis of disaster-specific concerns of paramedics. *Disaster Medicine and Public Health Preparedness, 5*, 46-53. doi: dmp.10-v4n2-hre10008 [pii]10.1001/dmp.10-v4n2-hre10008

Smith, E., Morgans, A., Qureshi, K., Burkle, F., & Archer, F. (2009). Paramedics' perceptions of risk and willingness to work during disasters. *The Australian Journal of Emergency Management, 24*(3), 21-27.

SPSS. (2009) (Version 18). Chicago,IL: SPSS Inc.

Straus, S. E., Wilson, K., Rambaldini, G., Rath, D., Lin, Y., Gold, W. L., & Kapral, M. K. (2004). Severe acute respiratory syndrome and its impact on professionalism: qualitative study of physicians' behaviour during an emerging healthcare crisis. *BMJ, 329*(7457), 83. doi: 10.1136/bmj.38127.444838.63bmj.38127.444838.63 [pii]

Tam, D. K., Lee, S., & Lee, S. S. (2007). Impact of SARS on avian influenza preparedness in healthcare workers. *Infection, 35*, 320-325. doi: 10.1007/s15010-007-6353-z

Tippett, V. C., Watt, K., Raven, S. G., Kelly, H. A., Coory, M., Archer, F., & Jamrozik, K. (2010). Anticipated behaviours of emergency prehospital medical care providers during an influenza pandemic. *Prehospital and Disaster Medicine, 25*(1), 20-25.

Tolomiczenko, G. S., Kahan, M., Ricci, M., Strathern, L., Jeney, C., Patterson, K., & Wilson, L. (2005). SARS: Coping with the impact at a community hospital. *Journal of Advanced Nursing, 50*, 101-110. doi: 10.1111/j.1365-2648.2005.03366.x

Tzeng, H. M., & Yin, C. Y. (2008). A crisis: Fear toward a possible H5N1 pandemic. *Journal of Nursing Care Quality, 23*, 177-183. doi: 10.1097/01.NCQ.0000313768.17514.a300001786-200804000-00013 [pii]

University of Pittsburg. (2011). Definition of a disaster. Retrieved from http://www.pitt.edu/~epi2170/lecture15/sld007.htm

U.S. Department of Health and Human Services (U. S. DHHS). (2008). *Definition of Health Care Personnel (HCP), March 2008*. Retrieved from http://www.hhs.gov/ash/initiatives/vacctoolkit/definition.html.

U.S. Department of Health and Human Services Health Resources and Services Administration Bureau of Health Professions. (2008). The physician workforce: Projections and research into current issues affecting supply and demand (pp. 1-106). Retrieved from http://bhpr.hrsa.gov/healthworkforce/reports/physwfissues.pdf

U.S. Department of Health and Human Services and Health Resources and Services Administration (U.S DHHS, HRSA). (2010). *The registered nurse population*.

Retrieved from http://bhpr.hrsa.gov/healthworkforce/rnsurveys/rnsurveyfinal.pdf.

Watt, K., Tippett, V. C., Raven, S. G., Jamrozik, K., Coory, M., Archer, F., & Kelly, H. A. (2010). Attitudes to living and working in pandemic conditions among emergency prehospital medical care personnel. *Prehospital and Disaster Medicine 25*(1), 13-19.

Wong, E. L., Wong, S. Y., Kung, K., Cheung, A. W., Gao, T. T., & Griffiths, S. (2010). Will the community nurse continue to function during H1N1 influenza pandemic: A cross-sectional study of Hong Kong community nurses? *BMC Health Services Research, 10*, doi: 1472-6963-10-107 [pii]10.1186/1472-6963-10-107

Wong, T. Y., Koh, G. C. H., Cheong, S. K., Sundram, M., Koh, K., Chia, S. E., & Koh, D. (2008). A cross-sectional study of primary-care physicians in Singapore on their concerns and preparedness for an Avian Influenza outbreak. *Annals Academy of Medicine, 37*(6), 458-464. Retrieved from http://www.annals.edu.sg/pdf/37volno6jun2008/v37n6p458.pdf

Appendix A: University of Minnesota Institutional Review Board Approval

TO : ducke001@umn.edu, savik001@umn.edu, conn0421@umn.edu,

The IRB: Human Subjects Committee determined that the referenced study is
exempt from review under federal guidelines 45 CFR Part 46.101(b) category #2
SURVEYS/INTERVIEWS; STANDARDIZED EDUCATIONAL TESTS; OBSERVATION OF PUBLIC
BEHAVIOR.

Study Number: 0910E73094

Principal Investigator: Susan Connor

Title(s):
Variables that Influence the Response of Health Care Professionals during a
Public Health Event (PHE)

This e-mail confirmation is your official University of Minnesota RSPP
notification of exemption from full committee review. You will not receive a
hard copy or letter.
This secure electronic notification between password protected authentications
has been deemed by the University of Minnesota to constitute a legal signature.

The study number above is assigned to your research. That number and the title
of your study must be used in all communication with the IRB office.

Research that involves observation can be approved under this category without
obtaining consent.

SURVEY OR INTERVIEW RESEARCH APPROVED AS EXEMPT UNDER THIS CATEGORY IS LIMITED
TO ADULT SUBJECTS.

This exemption is valid for five years from the date of this correspondence and
will be filed inactive at that time. You will receive a notification prior to
inactivation. If this research will extend beyond five years, you must submit a
new application to the IRB before the study?s expiration date.

Upon receipt of this email, you may begin your research. If you have questions, please call the IRB office at (612) 626-5654.

You may go to the View Completed section of eResearch Central at http://eresearch.umn.edu/ to view further details on your study.

The IRB wishes you success with this research.

We have created a short survey that will only take a couple of minutes to
complete. The questions are basic, but will give us guidance on what areas are
showing improvement and what areas we need to focus on:

https://umsurvey.umn.edu/index.php?sid=36122&lang=um

UNIVERSITY OF MINNESOTA
Change In Protocol Request

Route this form to: See instructions below. | **Rev:** Jan 2010

Instructions:
Use this form when submitting change requests on IRB protocols. This form is for use when the changes are initiated by the PI. Do not use this form to respond when changes are requested by the IRB. Please do not use this form when responding to changes requested in a stipulation letter.

1. Submit this form to the Human Research Protection Program:

U.S. Mail Address:
Human Research Protection Program
MMC 820
420 Delaware St. SE
Minneapolis, MN 55455-0392

Campus Mail:
Human Research Protection Program
MMC 820
Minneapolis Campus

Deliver to:
D-528 Mayo Memorial Building
Minneapolis Campus
8-4:30, M-F

IRB Protocol Information

IRB Study Number:	**0910E73094**
Current Principal Investigator:	**Susan Connor**
Primary Title:	Variables that Influence the Response of Health Care Professionals during a Public Health Event (PHE)
Submission Date	May 13,2010

Indicate the type of change/addition and attach all applicable documents:
☐ Protocol Amendment: Version , Dated
☐ Revised Investigator Brochure: Version , Dated
☒ Recruitment Changes/Advertisements
☐ Notice of Closure to Accrual
☐ Change(s) to Study Procedures
☐ Other:

Change in Protocol Approval
inclusion of snowball sampling
05/21/10
willi173

1. **Briefly summarize the change(s). For protocol amendments, do not say "See summary of changes provided with amendment." Rather, summarize the nature of the significant revisions.**

Addition of snowball sample method to the protocol. This method of nonprobability sampling is a variant of convenience sampling where participants are asked to refer other people who meet the eligibility criteria. Snowballing begins with a few eligible participants and then continues on the basis of participant referrals.

2. **Describe the rationale for the change(s):**

One of the original site coordinators, a registered nurse who works at a hospital whose administrator had to withdraw the site from the study due to personnel changes, contacted the PI to see if it was possible for her and some of her nurse colleagues to complete the survey because of their interest in the study. I am requesting this change because snowball sampling, where this RN would complete the survey and then invite her colleagues to also complete the web-based survey was not included in the original study protocol. These participants would complete the survey outside of their work environment and are not attached to any other participating sites which are located in a different geographical area. Data from these individuals will help build a robust sample necessary for sound analyses. I anticipate this method will result, at the most, in 20 participants. These individuals will help to balance the number of respondants from the three categories (i.e., military, Veterans Administration, and civilian) and I do not expect to exceed my original sample of 400 participants.

3. **In your opinion as principal investigator, how will these changes affect the overall risk to subjects in this study?**

There would be no change to the overall risk to the participants in this study.

4. Do the changes to the study prompt changes to the consent form(s)?

☒ **No.** ☐ **Yes.**

If yes, attach a copy of the revised consent form(s) with changes tracked or highlighted as well as a clean copy. Use this space to further describe consent form changes if necessary:

Principal Investigator's Signature **Date**

Appendix C: Survey Instrument

Public Health Event (PHE) Survey	
Personal Beliefs about Responding to Public Health Events	
A Public health event (PHE) is defined as an event that can result in an increased threat to the health of the general population (e.g. potential for imbalance between required resources and availability of resources at local, regional or national levels due to severe weather or other natural disaster, infectious disease outbreak, or terrorist attack). Directions: The ideas included in the statements that follow have been voiced by health care professionals about their personal beliefs associated with responding to an event that resulted in a large number of sick and injured people. Each statement describes a belief about possible results that might occur if a health professional responds to a future PHE. Select the response that indicates your belief about the likelihood of each outcome occurring if you respond to a future PHE.	
Responding as a Health Care Professional	
1.	I will use my **professional knowledge and skills** to help others when responding as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
2.	I will use my **knowledge and skills of emergency response** to help others when responding as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
3.	I will **endanger my life** when responding as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
4.	I will **lose sleep** when responding as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
5.	I will **provide appropriate care** when responding as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

6.	I will **fulfill my duty to care** when responding as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
7.	I will **distribute resources in ways that prevent as much death and disability as possible** when responding as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
8.	I will **place my family at increased risk** when responding as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

Feelings About Responding to a Public Health Event

Directions: Read each of the following statements and select the response that best represents your personal feelings about responding as a health care professional to an event resulting in a large number of sick, and injured.

1. Responding as a health professional to an event resulting in a large number of sick and injured would be:

not frightening	☐	☐	☐	☐	☐	frightening
exciting	☐	☐	☐	☐	☐	not exciting
good use of my time	☐	☐	☐	☐	☐	waste of my time
not rewarding	☐	☐	☐	☐	☐	rewarding
good	☐	☐	☐	☐	☐	bad
beneficial	☐	☐	☐	☐	☐	harmful
dangerous	☐	☐	☐	☐	☐	not dangerous
comfortable	☐	☐	☐	☐	☐	uncomfortable

What Others Think	
Directions: Read each of the following statements and select the response that best represents what you believe those individuals who are important to you feel about your responding as a health care professional to a future event resulting in a large number of sick and injured people.	
1.	My **closest family members** think I should respond as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
2.	My **boss** thinks I should respond as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
3.	My **colleagues** think that I should respond as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
4.	My **friends** think that I should respond as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
5.	Overall, the people who are important in my life think I should respond as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
6.	I believe the majority of my coworkers will come to work when a public health event occurs and results in a large number of sick and injured. *[programming note: separate page]*
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

Beliefs about Factors That Might Facilitate or Hinder Responding to a PHE	
Directions: Read each of the following statements and select the response that best represents what you believe will facilitate or hinder your response as a health care professional to an event resulting in a large number of sick and injured individuals.	
1.	I have **the knowledge** I need to respond effectively to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
2.	I have **the psychomotor skills** I need to respond effectively to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
3.	I have the **triage skills** I need to respond effectively to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
4.	I have the **team leadership skills** I need to respond effectively to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
5.	I have the **team membership skills** I need to respond effectively to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
6.	I have the **problem solving skills** I need to respond effectively to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
7.	I have the **interpersonal skills** to respond effectively to the sick and injured that result from a public health event.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

8.	I can **creatively use scarce resources** when responding to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
9.	I will be able to **make the necessary arrangements at work** if I want to respond to an event involving a large number of sick and injured individuals.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
10.	I can **make the necessary arrangements to cover my personal responsibilities** if I want to respond to an event involving a large number of sick and injured individuals.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

Ability to Respond to a PHE

Directions: Read the following statements and select the response that best represents your ability to respond as a health care professional to a future event resulting in a large number of sick and injured people.

1.	It would be _____ for me to provide appropriate care as a health professional to a large number of sick and injured due to a PHE.
	possible ☐ ☐ ☐ ☐ ☐ impossible
2.	It would be _____ for me to respond effectively as a health professional to a PHE resulting in a large number of sick and injured.
	possible ☐ ☐ ☐ ☐ ☐ impossible
3.	How much control will you have over your personal well-being during an event resulting in a large number of sick and injured?
	no control ☐ ☐ ☐ ☐ ☐ complete control
4.	It is up to me whether or not I respond as a health care professional to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
5.	I can provide safe patient care as a health care professional when responding to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
6.	I can find resources needed to care for patients when responding to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

7.	I can take care of myself when responding to an event resulting in a large number of sick and injured.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree
Intention to Respond to a PHE	
Directions: Read the statements below and select the response that best represents the likelihood of you responding as a health care professional to a public health event within the next 12 months.	
1.	I would respond to a **severe weather event** resulting in numerous sick or injured patients if one were to occur within the next 12 months.
	extremely likely ☐ ☐ ☐ ☐ ☐ extremely unlikely
2.	I would respond to **a terrorist attack** resulting in numerous sick or injured patients if one were to occur within the next 12 months.
	extremely likely ☐ ☐ ☐ ☐ ☐ extremely unlikely
3.	I would respond to a **natural disaster** resulting in numerous sick or injured patients if one were to occur within the next 12 months.
	extremely likely ☐ ☐ ☐ ☐ ☐ extremely unlikely
4.	I would respond to **an infectious disease outbreak** resulting in numerous sick or injured patients if one were to occur within the next 12 months.
	extremely likely ☐ ☐ ☐ ☐ ☐ extremely unlikely
5.	I would respond to an event resulting in numerous sick or injured patients ***in my community*** if one were to occur within the next 12 months.
	extremely likely ☐ ☐ ☐ ☐ ☐ extremely unlikely
6.	I would respond to an event resulting in numerous sick or injured patients ***in another state*** if one were to occur within the next 12 months.
	extremely likely ☐ ☐ ☐ ☐ ☐ extremely unlikely
7.	I would respond to an event resulting in numerous sick or injured patients ***in another country*** if one were to occur within the next 12 months.
	extremely likely ☐ ☐ ☐ ☐ ☐ extremely unlikely
Past PHE Preparedness Education and PHE Response Experience Directions: Read each question and provide the information requested.	

1.	I have responded to a PHE in the past : □ Yes □ No *[Skip logic note: if no skip to question #8]*
	Please describe each PHE experience separately.
2 a.	Type of PHE When did it occur? How long were you involved? What were your duties?
2 b.	Type of PHE When did it occur? How long were you involved? What were your duties?
2 c.	Type of PHE When did it occur? How long were you involved? What were your duties?
3.	What memories of the event have stayed with you to this day?
4.	When you responded what barriers did you encounter?
5.	Have you changed how you manage and provide care for, or communicate with, your patients since your experience with a PHE? □ Yes (if yes, please explain) □ No

6.	I received preparedness/disaster response education ***before*** I responded to a PHE
	□ Yes □ No *[skip logic note: if no skip to #8]*
7.	The emergency preparedness/response education I received prepared me to respond to the PHE
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree Please explain what part of this education was most useful:
	Directions: Read each question and provide the information on how prepared you are to respond as a health care professional to a public health event involving numerous sick and injured.
8.	I have received preparedness/disaster response education.
	□ Yes, less than 3 years ago □ Yes, more than 3 years ago *[skip logic note: if marked skip #15]* □ No *[skip logic note: if no skip to Characteristics section]*
9.	Over the past 36 months about how many hours did you spend participating in:
	_____hrs Face-to face classroom lecture(s) without simulation _____hrs On-line emergency preparedness course(s) without simulation _____hrs Simulated emergency response during a face-to-face class (e.g., exercise, game, table top) _____hrs Simulated emergency response during an on-line class (e.g., exercise, game, table top) _____hrs Simulated field emergency response exercise _____hrs Other; please describe: _____
10.	The face-to face classroom lecture(s) without simulation prepared me to respond to a PHE resulting in large number of sick and injured people.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree not applicable □ Comments

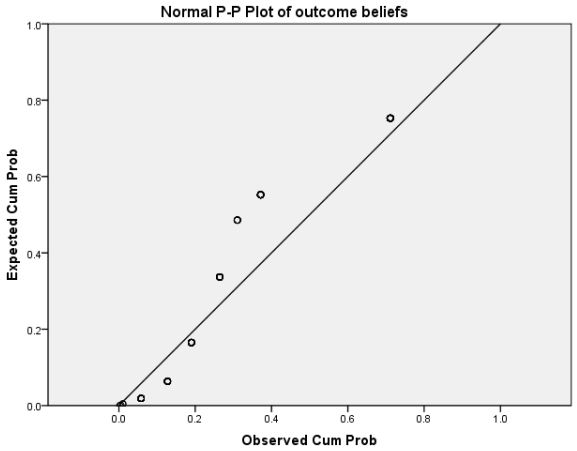
11.	The on-line emergency preparedness course(s) without simulation prepared me to respond to a PHE resulting in large number of sick and injured people.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree not applicable ☐ Comments
12.	The simulated emergency response exercise conducted during a face-to-face class prepared to respond to a PHE resulting in large number of sick and injured people.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree not applicable ☐ Comments
13.	The simulated emergency response exercise during an on-line class prepared me to respond to a PHE resulting in large number of sick and injured people.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree not applicable ☐ Comments
14.	The simulated field emergency response exercise prepared me to respond to a PHE resulting in large number of sick and injured people.
	strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree not applicable ☐ Comments
15.	Have you changed how you manage and provide care for, or communicate with, your patients after completing an emergency preparedness/response course? ☐ Yes (if yes, please explain) ☐ No

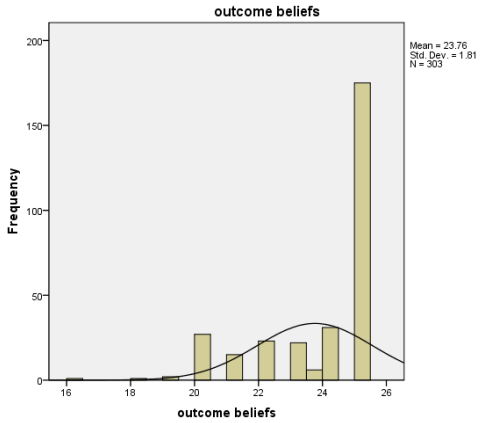
Characteristics	
Directions: Read each question then complete the information. Information provided will remain confidential.	
1.	Profession (Check all that apply and describe): □ Registered Nurse Specialty _____Certification_____ □ Physician Specialty _____ Certification _____ □ Dentist Specialty _____Certification _____ □ Pharmacist □ Other; please describe_____
2.	Education (check all that apply and describe): □ Associate Degree in _____ □ Baccalaureate Degree in _____ □ Master's Degree in _____ □ Professional Doctorate in _____ □ PhD (or other research oriented doctorate) _____
Other	
3.	I am a member of a disaster/emergency response team. □ Yes Name_____ □ No
4.	Current Work Setting
	□ Civilian Hospital □ Civilian Clinic □ Military Hospital □ Military Clinic □ VA Hospital □ VA Clinic □ Other; please describe: _____
5.	How many years have you been working for the same employer? _____ years
6.	How many years have you practiced as a health care professional? _____ years
7.	What is your gender? □ female □ male

8.	What is your national origin? □ U.S.A.- born □ Other country-born (please describe)_____
9.	What is your race/ethnic background (check all that apply) □ American Indian or Alaska Native □ Asian □ Black or African American □ Hispanic or Latino □ Native Hawaiian or Other Pacific Islander □ White
10.	What is your age?
11.	Would you be willing to take part in a focus group or interview regarding health care and disaster work should future funding become available? □ Yes □ No If yes, please contact Sue Connor, RN, MSN, Principal Investigator at conn0421@umn.edu and provide an e-mail address where you can be contacted.

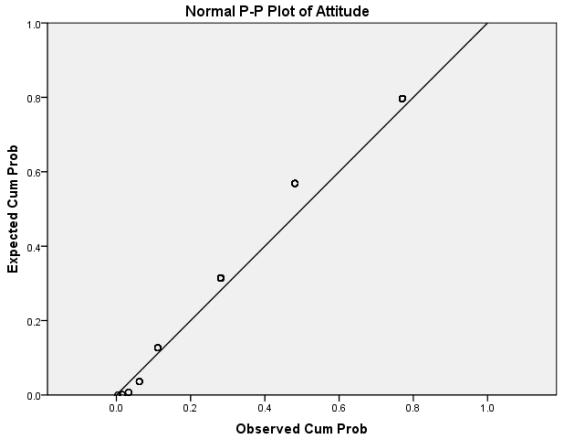
Appendix D: P-P Plots and Histograms

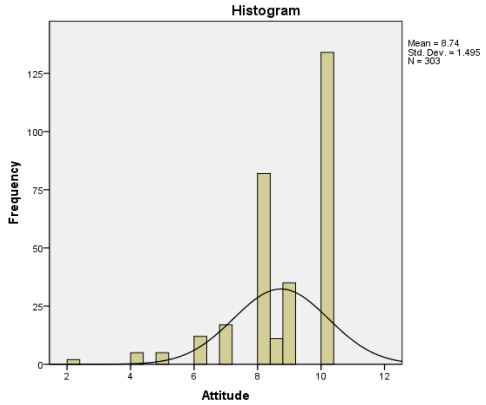
Outcome Beliefs



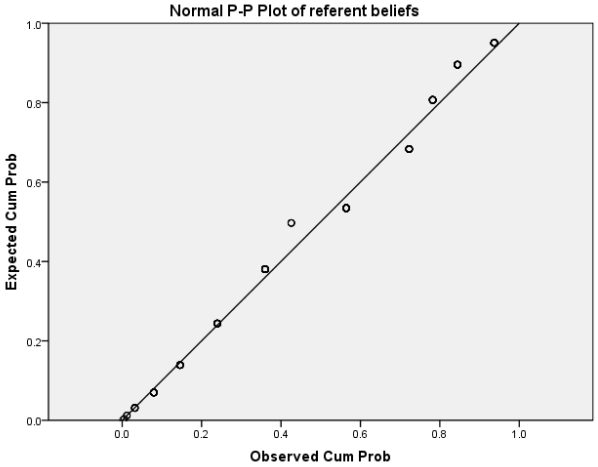


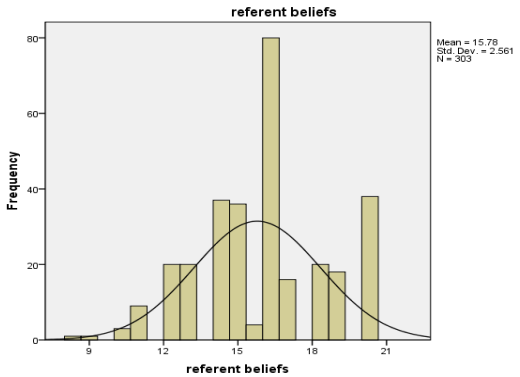
Attitude



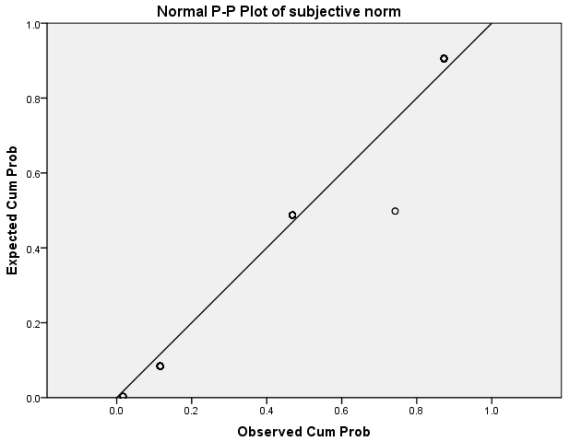


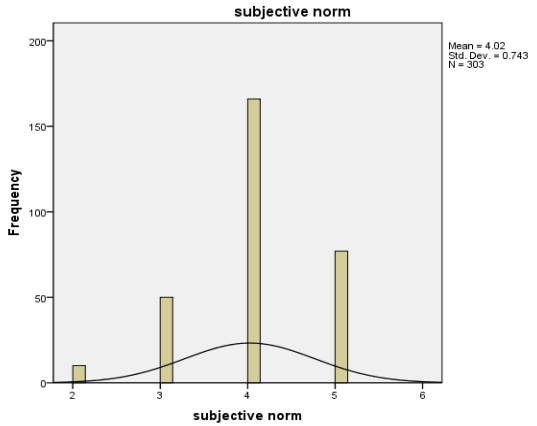
Referent Beliefs



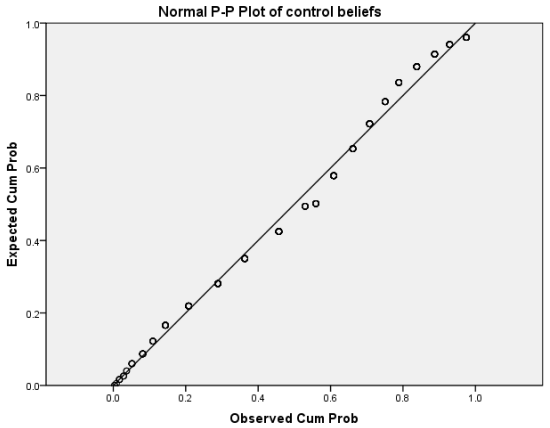


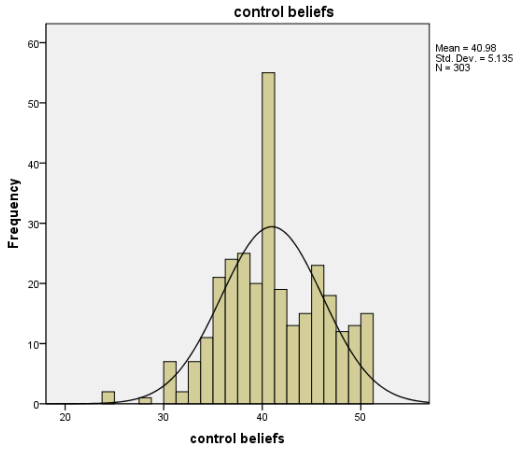
Subjective Norm



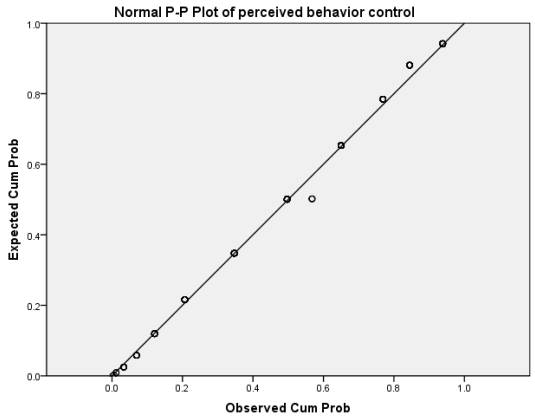


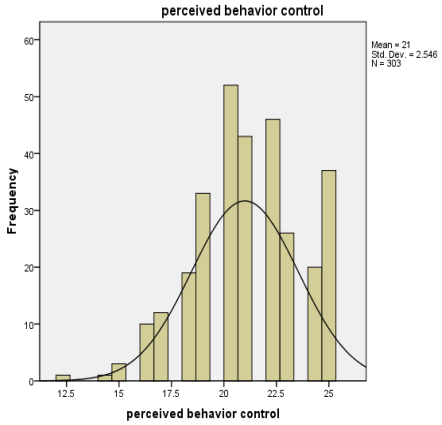
Control Beliefs



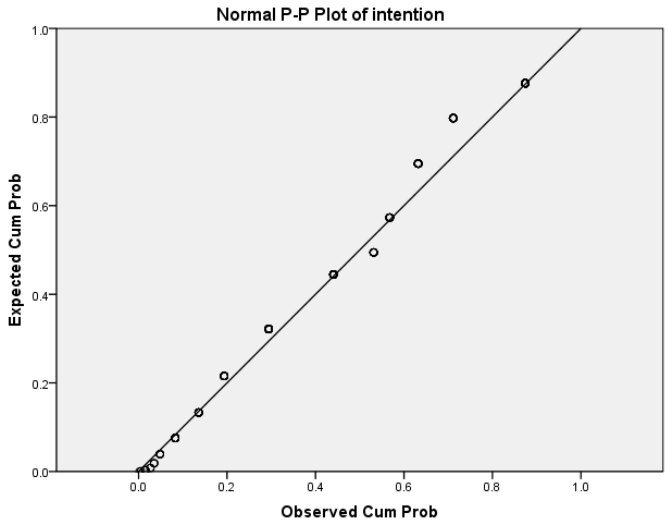


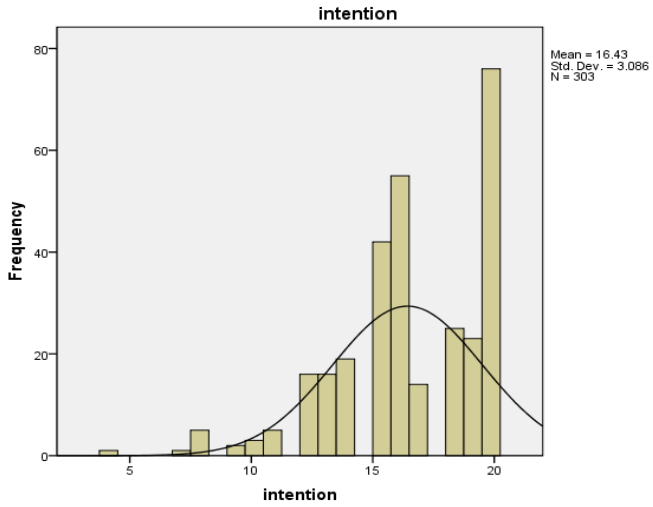
Perceived Behavioral Control





Intention


Normal P-P Plot of intention
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


intention
Mean = 16.43
Std. Dev. = 3.086
N = 303
Frequency
intention
0
20
40
60
80
5
10
15
20

Appendix E: Back-to-Back Stem-and-Leaf Plots

Table E1

Comparing Nurses and Other HCP: Intention Scale

00000000000000000000000000000000000000000000	2	0000000000000000000
00000000000000000000000000000000		
999999999999999999999		99
88888888888888888888888		888888
7777777777777		7
666666666666666666666666666666666666666666		6666666666
55555555555555555555555555555555555555555		55555555
4444444444444444444	1	44444
3333333333333333		3333333
222222222222222		2222
11111		11
000		0
99		9
88888		888
7	0	
4		
Nurses (*n* = 242)		Other HCP (*n* = 61)

Note. Cumulative scale comprised of 4 Likert-type items scored 1 (*extremely unlikely* [to respond]) to 5 (*extremely likely* [to respond]), Possible scores range 4 to 20.

Table E2

Comparing Nurses and Other HCP: Outcome Beliefs Scale

Nurses (*n* = 242)		Other HCP (*n* = 61)
555555555555555555555555555555555555555555555555 555555555555555555555555555555555555555555555555 555555555555555555555555555555555555555555555555		
55555555555555555555		555555555555555555555555555555555555
44444444444444444444444444	2	444444444444
33333333333333333		33333
222222222222222222		22222
1111111111		11111
00000000000000000000000		0000
9		9
8		
6	1	

Note. Cumulative scale comprised of 5 Likert-type items scored 1 (*strongly disagree* [that responding to a PHE would result in a positive outcome]) to 5 (*strongly agree* [that responding to a PHE would result in a positive outcome]). Possible scores range 5 to 25.

Table E3

Comparing Nurses and Other HCP: Attitude Scale

Nurses (n = 242)		Other HCP (*n* = 61)
22		
444		
555		
6666666666		44
7777777777777	0	55
88888888888888		66
888888888888888888888888888888888888888888888888		7777
9999999999		888888888888888
99999999999999999999999		99999999999
000000000		
00000000000000000000000000000000000000000000000000		00000000000000000000000000
00000000000000000000000000000000000000000000000000	1	

Note. Cumulative scale comprised of 2 semantic differential items scored 1 (for a negative value such as "*bad*") to 5 (for a positive value such as "*good*"). Possible scores range 2 to 10.

Table E4

Comparing HCP: Referent Beliefs Scale

00000000000000000000000000000000000	2	0000000000
99999999999999999		9999
8888888888888888888		88
777777777777777		7777
666666666666666666666666666666666666666666666666		
666666666666666666666666666666666666666666666666		
666666666666666666666666666666666666666666666666		66666666666666666
666666666666666666666666666666666666666666666666	1	
55555555555555555555555555555555		5555555
444444444444444444444444444444444		44444444
3333333333333333333		33333
22222222222222222222		2222
111111111		11
000		
9		
8	0	
Nurses (*n* = 242)		Other HCP (*n* = 61)

Note. Cumulative scale comprised of 4 Likert-type items scored 1 (*strongly disagree* [that PHE response is a behavioral expectation]) to 5 (*strongly agree* [that PHE response is a behavioral expectation]). Possible scores range 4 to 20.

Table E5

Comparing Nurses and Other HCP: Subjective Norm Scale

5555555555555555		
55555555555555555555555555555555555555555555555555		5555555555555555555
444444444444444		
44444444444444444444444444444444444444444444444444		
44444444444444444444444444444444444444444444444444	0	444444444444444444444444444444
44444444444444444444444444444444444444444444444444		4444444444
3333333333333333333333333333333333333333333333333		
2222222222		33333333333
Nurses (*n* = 242)		Other HCP (*n* = 61)

Note. Cumulative scale comprised of 1 Likert-type item scored 1 (*strongly disagree* [that engaging in PHE response is collectively expected by referents]) to 5 *(strongly agree* [engaging in PHE response is collectively expected by referents]). Possible scores range 1 to 5.

Table E6

Comparing Nurses and Other HCP: Control Beliefs Scale

0000000000000	5	00
99999999999999		999
888888888888		888
77777777777777777		77777
666666666666		66
55555555555	4	555
444444444444444		4444
3333333333333		33333
222222222222222222		22
11111111111111111		111
00000000000000000000000000000000000000		00000
9999999999999999999		999
88888888888888888888888		888
77777777777777777777777		777777
66666666666666		6666666
555555		5
4444444444	3	444
3333333		33
22		
111		1
0000		
8	2	
44		
Nurses (*n* = 242)		Other HCP (*n* = 61)

Note. Cumulative scale comprised of 10 Likert-type items scored 1 (*strongly disagree* [that sufficient control over factors exist]) to 5 (*strongly agree* [that sufficient control over factors exist]). Possible scores range 10 to 50.

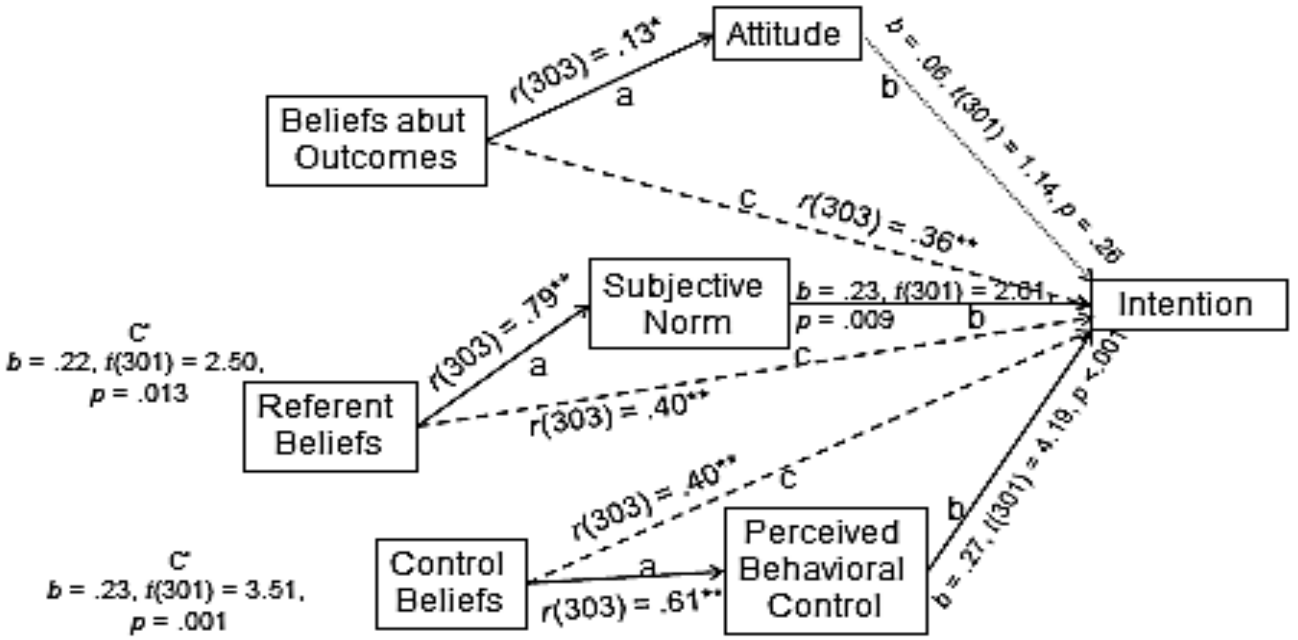
Table E7

Comparing Nurses and Other HCP: Perceived Behavioral Control Scale

55555555555555555555555555555555555		5555
4444444444444444		444
333333333333333333333333	2	33333
22222222222222222222222222222222222222222222		2222222222
1111111111111111111111111111111111111111111		1111111
000000000000000000000000000000000000000000000000		000000000000
99999999999999999999999999999		99999999
8888888888888888		88888
77777777	1	77777
66666666		66
55		5
4		
2		
Nurses (*n* = 242)		Other HCP (*n* = 61)

Note. Cumulative scale comprised of 5 Likert-type items scored 1 (*strongly disagree* [that PHE response is possible]) to 5 (*strongly agree* [that PHE response is possible]). Possible scores range 5 to 25.

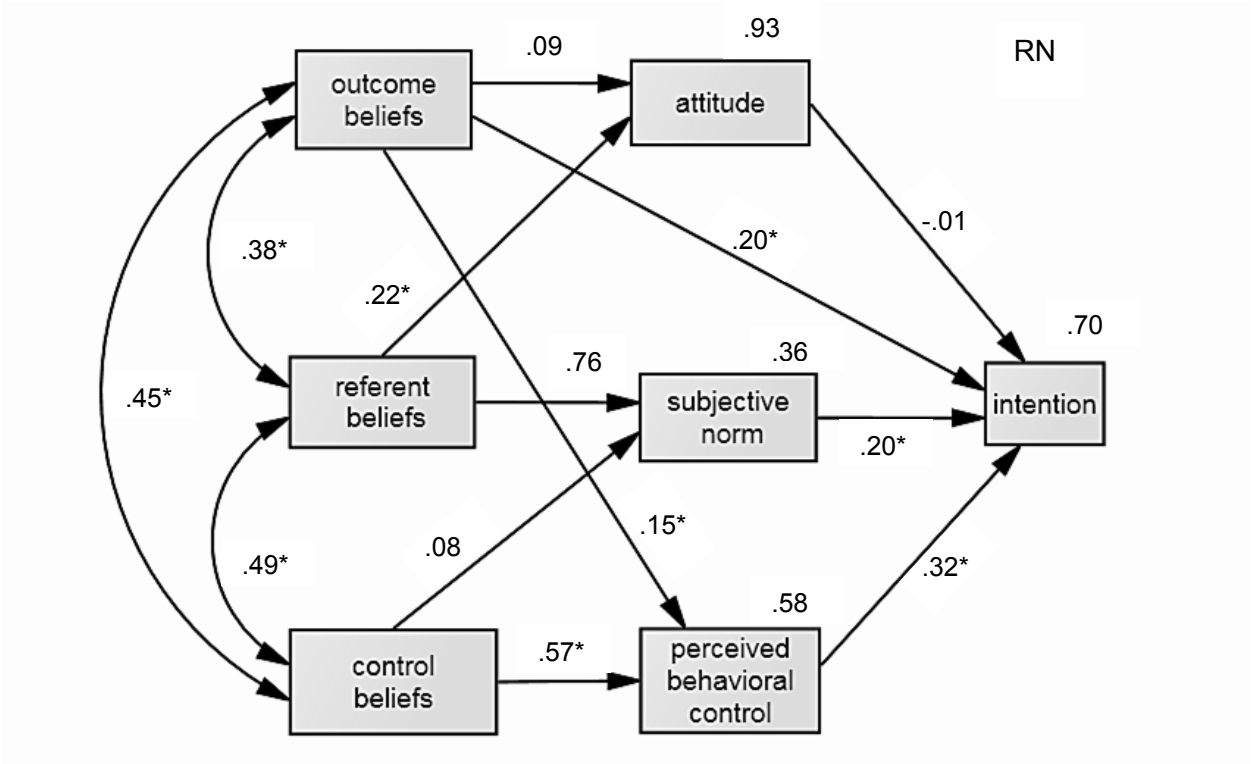
Appendix F: Summary of Mediation Analysis of the Estimated PHE Model

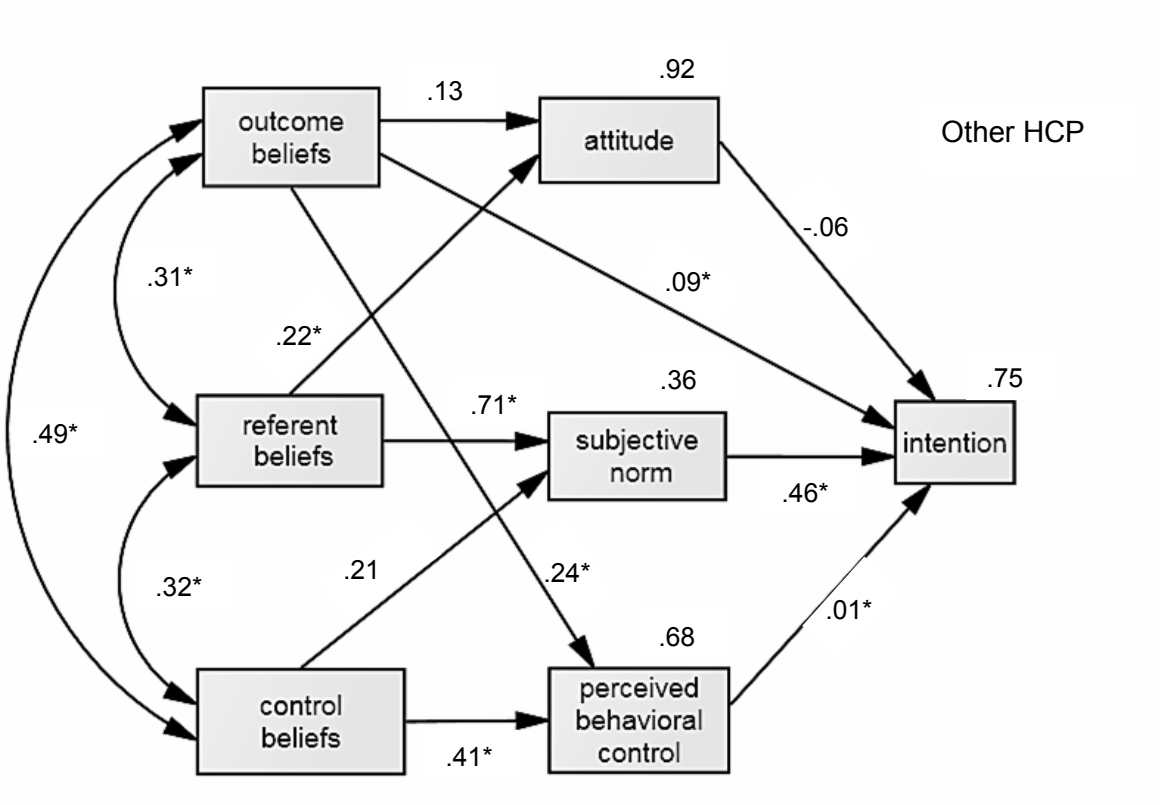


Summary of the mediation analyses of the TPB-based six-factor observed variable model for PHE response (see Figure 4.1) confirmed the theorized effect of referent beliefs on intention was mediated by subjective norm and the effect of control beliefs on intention was mediated by perceived behavioral control. The two indirect effects were discovered to be mediated partially, not completely. However, the posited indirect effects of outcome beliefs on intention were not mediated by attitude. Bolded lines (both solid and dashed) indicate significant relationships. * indicated $p < .05$, ** indicated $p < .01$.

Appendix G: PHE Response Model Moderated by Health Profession Affiliation

The standardized path coefficients for the RN (n =242) and Other HCP group (n = 61) showed that the two groups differed in the magnitude of the relationships among the indirect and direct predictors of intention. Pairwise parameter comparisons of both models identified a statistically significant path difference between subjective norm and intention. The unexplained variance (1- R^2) for subjective norm, perceived behavioral control and intention are displayed above the respective boxes. The correlations between the three belief scales are shown; all correlations were significant. Model fit was adequate $X^2(16) = 21.989$, $p = .144$; TLI = .978; RFI = .925; RMSEA = .035; 90%CI [.00, .068]. * Significant path coefficients ($p < .05$).




outcome beliefs
attitude
referent beliefs
subjective norm
intention
control beliefs
perceived behavioral control
.13
.92
-.06
.09*
.31*
.22*
.36
.75
.71*
.49*
.46*
.32*
.21
.24*
.01*
.68
.41*
Other HCP

Appendix H: Comparison of Males and Females

Table H1

Comparing Males (upper triangle) and Females (lower triangle) Correlations

Variable	1.	2.	3.	4.	5.	6.	7.
1. Intention	-	.236	-.071	.333*	.301*	.396**	.176
2. Outcome Beliefs	.375**	-	.299*	.249	.163	.423**	.488**
3. Attitude	.135*	.143	-	.259	.387**	.252	.341*
4. Referent Beliefs	.403**	.390**	.234	-	.753**	.483**	.414**
5. Subjective Norm	.414**	.375**	.242**	.801**	-	.435**	.463**
6. Control Beliefs	.380**	.454**	.221**	.457**	.459**	-	.675**
7. Perceived Behavioral Control	.453**	.392**	.170	.356**	.336**	.597**	-

Note. Scale scores were derived from the TPB-based PHE survey. Male *n* = 48; female *n* = 253 (2 participants did not respond to this question).

*Correlation is significant at the .05 level (2-tailed). **Correlation is significant at the .01 level (2-tailed).

Table H2

Comparing Males and Females

Predictor (*M*)	*Males* *n = 48* *M (SD)*	*Females* *n = 253* *M (SD)*	Mean Difference	95% CI	*t* (299)	*p*
Intention (*M* = 16.4)	16.8 (3.22)	16.4 (3.03)	.43	[-.52, 1.3]	.89	.37
Outcome Beliefs (*M* = 23.8)	23.81 (1.79)	23.76 (1.81)	.05	[-.51, .61]	.17	.86
Attitude (*M* = 8.74)	8.96 (1.25)	8.71 (1.52)	.25	[-.21, .71]	1.06	.29
Referent Beliefs (*M* = 15.8)	16.55 (2.27)	15.66 (2.58)	.89	[.11, 1.68]	2.23	.03
Subjective Norm (*M* = 4.02)	4.08 (.71)	4.02 (.75)	.06	[-.17, .29]	.54	.59
Control Beliefs (*M* = 41.0)	42.00 (5.25)	40.78 (5.06)	1.22	[-.36, 2.80]	1.52	.13
Perceived Behavioral Control (*M* = 21.0)	21.31 (2.57)	20.95 (2.55)	.36	[-.43, 1.15]	.91	.37

Note. The variables are scaled Likert-type and semantic differential items based on the TPB. Scores range from 1 (*not favorable* toward PHE response) to 5 (*favorable* toward PHE response). Male *n* = 48; female *n* = 253 (2 participants did not respond to this question). The nominal type 1 error rate was set at .05, two-tailed.

Appendix I: Comparison of Team Members and Nonmembers

Table I1

Comparing Those With (upper triangle) and Without (lower triangle) Event Team Membership Correlations

Variable	1.	2.	3.	4.	5.	6.	7.
1. Intention	-	.097	-.058	.233	.284	.207	.181
2. Outcome Beliefs	.419**	-	.370*	.469**	.396**	.660**	.722**
3. Attitude	.161**	148*	-	.216	.198	.171	.236
4. Referent Beliefs	.434**	.353**	.259**	-	.833**	.473**	.511**
5. Subjective Norm	.426**	.337**	.286**	.785**	-	.472**	.459**
6. Control Beliefs	.436**	.432**	.242	.456**	.450**	-	.699**
7. Perceived Behavioral Control	.465**	.360**	.195**	.338**	.336**	.594**	-

Note. Scale scores were derived from the TPB-based PHE survey. Team member $n = 45$; nonmembers $n = 258$.

*Correlation is significant at the .05 level (2-tailed). **Correlation is significant at the .01 level (2-tailed).

Table I2

Comparing Health Care Personnel With and Without Event Team Membership

Predictor (*M*)	*With* *n = 44* *M (SD)*	*Without* *n = 258* *M (SD)*	Mean Difference	95% CI	*t* (301)	*p*
Intention (*M* = 16.4)	16.64 (3.66)	16.39 (2.98)	.25	[-.74, 1.3]	.49	.62
Outcome Beliefs (*M* = 23.8)	23.75 (1.70)	23.77 (1.83)	-.02	[-.59, .56]	-.06	.96
Attitude (*M* = 8.74)	8.84 (1.45)	8.72 (1.51)	.12	[-.36, .60]	.50	.62
Referent Beliefs (*M* = 15.8)	16.02 (2.89)	15.74 (2.50)	.28	[-.54, 1.10]	.68	.50
Subjective Norm (*M* = 4.02)	4.04 (.88)	4.02 (.72)	.03	[-.25, .30]	.18	.86
Control Beliefs (*M* = 41.0)	43.00 (4.82)	40.63 (5.11)	2.37	[.80, 3.99]	2.90	.004
Perceived Behavioral Control (*M* = 21.0)	21.40 (2.72)	20.93 (2.51)	.47	[-.40, 1.28]	1.15	.25

Note. The variables are scaled Likert-type and semantic differential items based on the TPB. Scores range from 1 (*not favorable* toward PHE response) to 5 (*favorable* toward PHE response). Team member *n* = 45; nonmembers *n* = 258. The nominal type 1 error rate was set at .05, two-tailed.

Appendix J: Education Group Comparisons

Table J1

Comparing Those With [a] *(lower triangle) and Without* [b] *(upper triangle) PHE Education* Correlations

Variable	1.	2.	3.	4.	5.	6.	7.
1. Intention	-	.353**	.169	.463**	.341**	.369**	.415**
2. Outcome Beliefs	.363**	-	.074	.256**	.252*	.453**	.302**
3. Attitude	.098	.239**	-	.282**	.371**	.171	.165
4. Referent Beliefs	.351**	.428**	.234**	-	.788**	.465**	.300**
5. Subjective Norm	.404**	.391**	.225**	.794**	-	.462**	.318**
6. Control Beliefs	.399**	.447**	.270**	.444**	.430**	-	.591**
7. Perceived Behavior Control	.394**	.465**	.216**	.379**	.352**	.607**	-

Note. Scores on Likert-type and semantic differential items range from 1 (*unfavorable* belief or attitude toward PHE response) to 5 (*favorable* belief or attitude toward PHE response). Two people did not respond to this question.

[a] Those with PHE related education, *n* = 199. [b] Those without PHE education *n* = 102.

*Correlation is significant at the .05 level (2-tailed). **Correlation is significant at the .01 level (2-tailed).

Appendix K: Comparison of Those with PHE Experience and Those without

Table K1

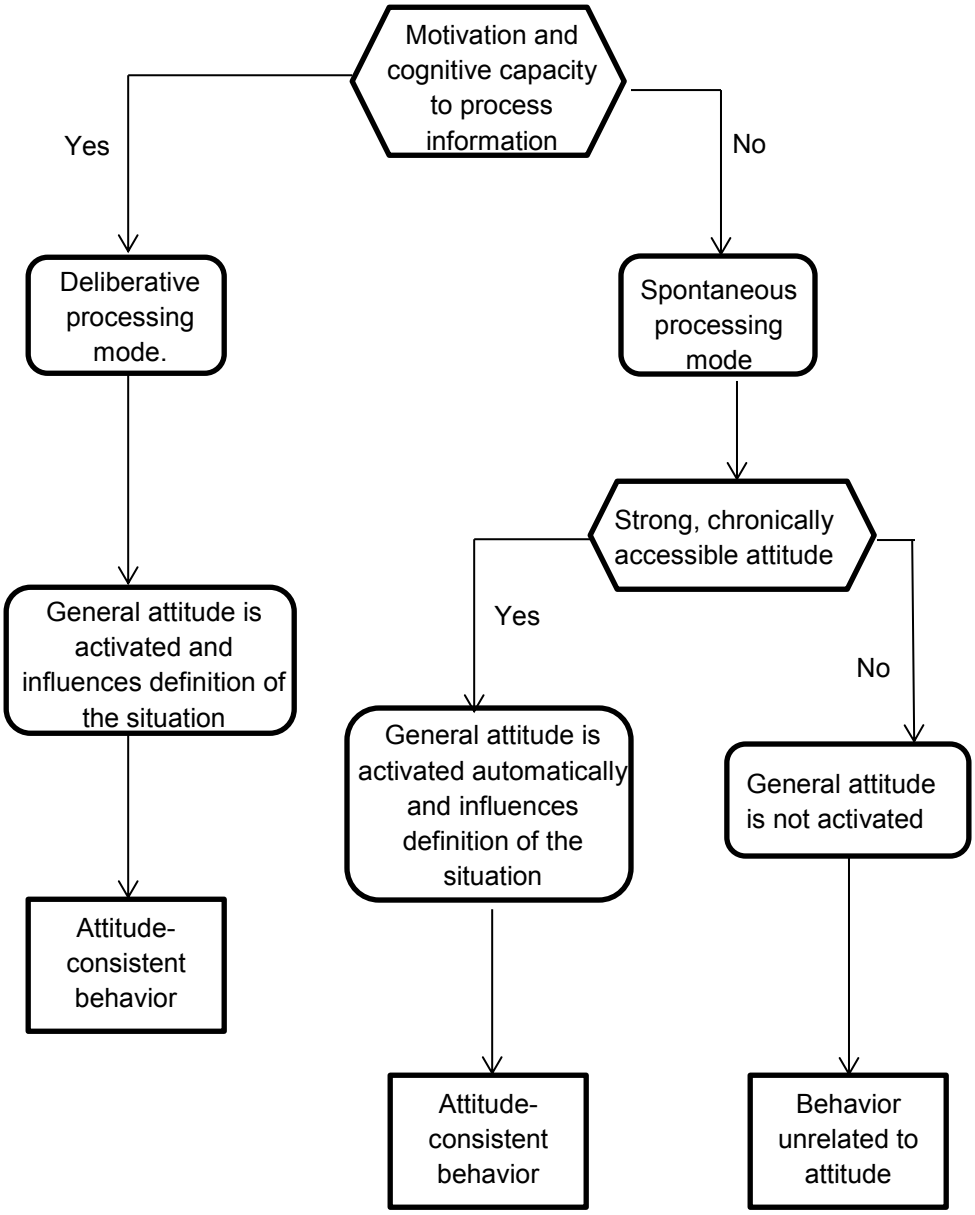
Comparing Those With (lower triangle) and Without (upper triangle) PHE Experience Correlations

Variable	1.	2.	3.	4.	5.	6.	7.
1. Intention	-	.379**	.143*	.399**	.397**	.390**	.401**
2. Outcome Beliefs	.347**	-	.151*	.361**	.327**	.461**	.388**
3. Attitude	-.030	.316*	-	.261**	.281**	.229**	.213**
4. Referent Beliefs	.321*	.441**	.171	-	.797**	.409**	.292**
5. Subjective Norm	.326*	.454**	.182	.764**	-	.407**	.283**
6. Control Beliefs	.303*	.542**	.196	.628**	.538**	-	.598**
7.Perceived Behavioral Control	.404**	.540**	.113	.666**	.614**	.668**	-

Note. Scale scores were derived from the TPB-based PHE survey. Experienced n = 59, no experience n = 244.

*Correlation was significant at the .05 level (2-tailed). **Correlation was significant at the .01 level (2-tailed).

Appendix L: MODE Model



The acronym MODE is used to suggest that "**m**otivation and **o**pportunity act as **de**terminants of spontaneous versus deliberative attitude to behavior processes" (Fazio, 1995, p. 257). This model draws attention to the preconceived biases and spontaneous versus deliberative processes that can influence the link between general attitudes to a target behavior.