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The dynamics of travel avoidance: The case of Ebola in the U.S.

Ignatius Cahyanto, Ph.D., Assistant Professor & Program Coordinator [a,*],
Michael Wiblishauser, Ph.D., CHES, Assistant Professor of Health Education [b],
Lori Pennington-Gray, Ph.D., Professor & Director of Tourism Crisis Management Initiative [c],
Ashley Schroeder, Ph.D., Assistant Professor [d]

[a] Tourism & Hospitality Management, School of Business, Black Hills State University, Meier Hall 335, 1200 University Street Unit 9007, Spearfish, SD 57799-9007, United States
[b] Lock Haven University, Department of Health Sciences, 142 Health Professions Center, Lock Haven, PA 17745, United States
[c] University of Florida, 325 FLG, PO Box 118209, Gainesville, FL 32611, United States
[d] University of Hawaii at Mānoa, School of Travel Industry Management, 2560 Campus, Honolulu, HI 96822, United States

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ABSTRACT

The study examined factors that influenced Americans' avoidance of domestic travel due to confirmed cases of Ebola in the United States in late 2014. The Health Belief Model served as a theoretical framework for the study. Data were generated from 1613 Americans from an online survey. Perceived susceptibility and self-efficacy were found to significantly influence domestic travel avoidance. The findings also supported the significant role of perceived risk, subjective knowledge, age, and gender. Given the possibility that an Ebola outbreak may reemerge in the future and the emergence of additional health-related crises (e.g., Zika virus), the findings may also aid the tourism industry in planning for and responding to other health pandemics.

1. Introduction

One of most visible media stories in 2014 was the Ebola outbreak. Prior to the 2014 West Africa outbreak, the world had experienced a series of global disease outbreaks such as Severe Acute Respiratory Syndrome (SARS) in 2002–2004 and H1N1 influenza virus in 2009. In 2009, both the global financial crisis and the H1N1 pandemic impacted global travel, with a 4% decrease to 880 million international arrivals (Leggat, Brown, Aitken, & Speare, 2010). Several studies have consistently found that pandemics contribute to heightened concerns about international travel (Lee, Son, Bendle, Kim, & Han, 2012; Kuo, Chen, Tseng, Ju, & Huang, 2008).

Responses to an outbreak have often affected levels of concern and travel intentions. For instance, during the rising prevalence of H1N1 in 2009, the Australian Government introduced a series of procedures that were geared toward incoming and outgoing travelers (Leggat et al., 2010). In addition, Leggat, Brown, and Speare (Leggat et al., 2010) found that while more than half of Queensland travelers showed some concern over the pandemic, a majority would not postpone travel even if they demonstrated H1N1-like symptoms. Another study by Lee et al. (2012) found that perceptions associated with H1N1 were not significant predictors of travel intentions. However, Reisinger and Mavondo (2005) found that perceptions of a disease are important indicators of altered travel patterns. One possible explanation is that travelers might develop adaptive behaviors (personal health interventions) which may prevent them from contracting the disease.

Public perceptions associated with the Ebola outbreak were mostly negative in the U.S. A Washington Post-ABC News survey found that almost two-thirds of Americans were concerned about a widespread Ebola epidemic in the U.S. (Dennis & Craighill, 2014). However, the same survey also found that more than half of the sample was very confident in the federal government's ability to effectively respond to the outbreak in the U.S. Similarly, another survey conducted by Global Business Travel Association found that most respondents surveyed believed that the outbreak had a marginal effect on business travel (Martin, 2014). Nonetheless, the aforementioned surveys did not explain underlying determinants of such behaviors, nor did they explain whether or not domestic travelers were concerned with the disease outbreak, both of which are critical for travel awareness campaigns.

While much has been written on the relationship between pandemic disease and international travel, little is known about potential travelers' behaviors regarding domestic travel during a pandemic outbreak. Understanding travelers' behaviors warrants further exploration because of the unique nature of the Ebola outbreak in the U.S and several confirmed Ebola cases within the U.S. In addition, constant

* Corresponding author.
E-mail addresses: ignatius.cahyanto@bhsu.edu (I. Cahyanto), mjw939@lhup.edu (M. Wiblishauser), pengray@hhp.ufl.edu (L. Pennington-Gray), aschroe@hawaii.edu (A. Schroeder).

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media coverage of Ebola cases in the U.S. might lead to travel avoidance even for travel within the U.S. Likewise, there is a paucity of literature which examines perceptions, beliefs, and attitudes that travelers have pertaining to the transmission and prevention of Ebola. While health experts argued that the possibility of contracting Ebola in the U.S is marginal, public opinion might be altered due to constant media coverage. Coupled with the fact that this was the first time that Ebola cases were confirmed in the U.S., the authors were interested to know to what extent such perceptions might influence travel intentions. Additionally, minimal attention has been given to the relationship between a pandemic and domestic travel.

Because the dynamic nature of a pandemic means that behaviors can have a substantial impact on the course of an outbreak (Halloran et al., 2008), understanding individuals' behavior and its relation to their perceptions of risk is therefore imperative in terms of effective control of an infectious disease outbreak (Ibuka, Chapman, Meyers, Li, & Galvani, 2010). The Health Belief Model (HBM) is often considered an alternative because it considers risk perceptions to be one of the key drivers of behaviors (Brewer & Hallman, 2006). The model suggests that engagement in a protective behavior may be influenced by perceived costs and benefits of such a behavior (Chapman & Coups, 1999).

This study employed the Health Belief Model (HBM) as the theoretical framework to examine how cognitive factors might have influenced behavioral responses in the event of an Ebola outbreak. In this study, we explored determinants of travel avoidance during an Ebola outbreak. Specifically, the research questions for this study were:

1) What is the relationship between perceived travel risk and the likelihood of travel avoidance in the U.S. due to Ebola?
2) What is the relationship between perceived susceptibility and the likelihood of travel avoidance in the U.S. due to Ebola?
3) What is the relationship between perceived severity and the likelihood of travel avoidance in the U.S. due to Ebola?
4) What is the relationship between self-efficacy and the likelihood of travel avoidance in the U.S. due to Ebola?
5) What is the relationship between subjective knowledge and the likelihood of travel avoidance in the U.S. due to Ebola?
6) What is the relationship between select sociodemographic factors and the likelihood of travel avoidance in the U.S. due to Ebola?

Fig. 1 outlines our guiding framework.

2. Context of the study

The Ebola outbreak in 2014 resulted in collaboration between nations in order to contain the epidemic. The disease is derived from one or more strains of the Ebola virus that may be transmitted either from person to person or from animal to human (World Health Organization, 2014). Some of the symptoms associated with the virus are: fever, fatigue, vomiting, muscle pain, and severe headache (Mayo Clinic, 2014). On average, an infected individual has an approximate 30% chance of surviving the disease and more than 1000 individuals had succumbed to the virus by the end of 2014 (Frieden, Damon, Bell, Kenyon, & Nicol, 2014).

The Centers for Disease Control and Prevention (CDC) (2015a) recommends that individuals practice basic sanitation (use soapy water when washing hands or alcohol-based sanitizer), avoid funeral or burial rituals for Ebola victims, avoid an infected individual's blood or bodily fluids, and refrain from contact with non-human primates and bats. The 2014 outbreak of the Ebola virus occurred primarily on the African continent. Due to fear of the Ebola virus, there were warnings against travel to affected nations. Countries which suffered Ebola outbreaks included Uganda, Congo, and West Africa (i.e. Guinea, Liberia, Sierra Leone) (Centers for Disease Control and Prevention, 2015b). The Centers for Disease Control and Prevention (2015b) issued a Level 3 Travel Advisory (Avoid Non-Essential Travel) for the nations of Liberia, Sierra Leone, and Guinea.

The belief at that time was that there was little risk of Ebola spreading from the infected African regions and becoming a massive pandemic affecting other geographic regions throughout the world (Gomes et al., 2014). Though air travel is a popular means of travel, there was little risk of contraction Ebola on commercial flights, a fact not well known to the vast majority of travelers. Thus, it was necessary to educate the general public about the minimal dangers associated with international flights.

Screenings at major airports that dealt with flights from Ebola-affected African nations was one method that the World Health Organization used in an attempt to contain the virus. Bogoch et al. (2015) estimated that 2–8 travelers with the Ebola virus departed monthly on a commercial flight from Liberia, Sierra Leone, and Guinea. Both entry and exit screenings of passengers coming from Africa into Europe or other Western nations helped to detect at least 50% of infected individuals (Read, Diggle, Chirombo, Solomon, & Baylsis, 2015).

The Centers for Disease Control and Prevention in the U.S. issued guidelines pertaining to travelers coming to the U.S. from Ebola-affected nations. The Centers for Disease Control and Prevention recommended that asymptomatic travelers be monitored; however, they were not required to be placed in quarantine (McCarthy, 2014). Some countries issued their own precautions regarding Ebola screenings. Nigeria screened all incoming flight passengers for the disease (Gostin, Lucey, & Phelan, 2014). Among other nations, Gambia and Kenya issued travel bans on passengers arriving from Guinea, Liberia, and Sierra Leone (Poletto et al., 2014).

Some scientists and healthcare professionals contended that the travel ban or quarantine could translate into the misuse of needed medical supplies (Folayan & Brown, 2015). They also cited past failures of quarantines associated with the SARS illness (Barbisch, Koenig, & Shih, 2015) and the possible negative repercussions that travel bans may have had on the economies of struggling nations (Mackenzie, 2014).

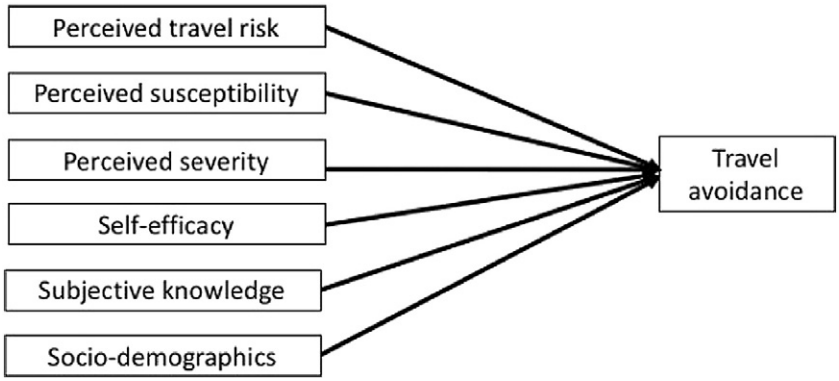

Fig. 1. Guiding framework.

3. Literature review

3.1. Health Belief Model

In order to gauge respondents' opinions and perceptions pertaining to the Ebola virus, we utilized constructs derived from the Health Belief Model (HBM). The HBM is a theoretical model which examines variables which predict, influence, and explain why individuals engage in certain risk-related behaviors (Rosenstock, Strecher, & Becker, 1988; Ayele, Abebe, & Girma, 2012; Nicholls, 2006; Chen et al., 2011; Setbon & Raude, 2010). Individuals are more likely to engage in risk reduction behaviors if they feel susceptible to a specific illness/condition, perceive the illness/condition to be severe, and/or believe that preventive behaviors outweigh the costs of engagement (Chapman & Skinner, 2008). The model contains six major key constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.

The HBM is an effective tool in creating and implementing health interventions to change individuals' maladaptive behavioral patterns. The model has been successful in promoting health education (Sharifirad, Entezari, Kamran, & Azadbakht, 2009; Cross, March, Lapsley, Byrne, & Brooks, 2006) or compliance of healthy dietary regimens (Deshpande, Basil, & Basil, 2009). When assessing the model's constructs, perceived barriers and perceived benefits have been found to have the strongest predictive powers (Janz & Becker, 1984; Carpenter, 2010). Perceived severity has been found to exhibit the weakest predictive power for behavior choices (Janz & Becker, 1984). Several factors that may have moderating influences on the predictive power of the HBM are: length of time when measuring beliefs and behavior; treatment vs. prevention actions; and regimens pertaining to certain behaviors (Carpenter, 2010). One study discovered that individuals are more accepting of preventive measures when they believe that there are benefits to adopting the behavior and if they perceive that they are susceptible to a particular disease (Brewer & Fazekas, 2007).

Perceived susceptibility explains individual belief(s) about the risk of contracting an illness (Brewer & Fazekas, 2007). In many circumstances, individuals who perceive that they are at high risk of contracting a disease or condition are more likely to take preventive measures (Brewer et al., 2007). Those who suffer from the symptoms of a disease are likely to believe that preventive and avoidant actions will help decrease the risk of developing a disease (Gao, Nau, Rosenbluth, Scott, & Woodward, 2000).

Perceived severity relates to individual concern with the seriousness of a condition (Brewer & Fazekas, 2007). Individuals that perceive a disease to be severe are more likely to engage in preventive measures (Hanson & Benedict, 2002). This is consistent with theories which suggest that, in general, people avoid unpleasant stimuli in most instances. Not all studies yielded a positive relationship between high perceptions of severity and engagement in preventive measures. For example, a study looking at condom usage in Africa found that subjects' perceptions of the severity of AIDS/HIV did not increase their usage of condoms during sexual intercourse (Hounton, Carabin, & Henderson, 2005).

Perceived benefits are associated with the outcomes of a certain behavior to minimize susceptibility to a disease or illness (Hanson & Benedict, 2002). Individuals who perceive that there are benefits to adopting certain behaviors are more likely to perform those behaviors. This can translate into adherence to treatment or preventive measures (Adams & Scott, 2000). In order to have members from a target population get vaccines, it would be paramount to promote the benefits derived from getting the vaccines. Those who perceive few or no benefits associated with vaccines are less likely to engage in this behavior (Smith et al., 2011). Many successful prevention programs, which seek to change human behavior, take the importance of perceived benefits into account (Epstein, Griffin, & Botvin, 2000).

In some instances, perceived benefits may not be sufficient enticement for individuals to engage in certain behaviors. Stroud, Minahan, and Sabapathy (2009) found perceived benefits associated with exercising were not sufficient in promoting physical activity in sufferers of multiple sclerosis. The researchers found that self-efficacy was more effective as a positive predictor of exercise in individuals diagnosed with multiple sclerosis than perceived benefits. Therefore, while perceived benefits may predict acquisition of behaviors, this is not conclusive.

Perceived barriers identify concerns about performing health promotion behaviors (Hanson & Benedict, 2002). Individuals may utilize a cost-benefit analysis in weighing the perceived barriers against the perceived benefits. Individuals who perceive more barriers than benefits to performing a behavior are less likely to perform the said behavior (Janz & Becker, 1984). An effective strategy in employing individuals to adopt a targeted behavior is to minimize their perceived barriers (Buglar, White, & Robinson, 2010). In the present study, the probable perceived barriers (e.g., contraction of the Ebola virus) may hinder respondents' desires to perform the advocated risk reduction behavior.

Cues to action are strategies or sources of information that promote adoption of a behavior (Cerkoney & Hart, 1980), such as information about Ebola at the airport. Many individuals may weigh the perceived benefits against the perceived barriers to a particular behavior before taking action. Sometimes this may not be sufficient and, as such, individuals need to feel motivated to perform the targeted behavior. Successful strategies for adoption of behaviors utilize specific cues which are associated with conducting the target behaviors (Cerkoney & Hart, 1980).

Self-efficacy measures one's level of confidence to adopt a behavior. High levels of self-efficacy may lead to the likelihood that behavior is initiated and sustained throughout aversive situations (Bandura, 1977). Interventions which aim to increase the use of healthy preventive methods will need to take into account the impact of an individual's perceptions of their self-efficacy. This can be crucial in helping individuals adopt important preventive health behaviors that may lead to averting fatalistic outcomes (Tavafian, Hasani, Aghamofaei, Zare, & Gregory, 2009; Iskender & Akin, 2010).

The HBM has been employed to predict risk perceptions associated with the transmission of pandemic influenza A/H1N1 (Setbon & Raude, 2010), acceptability of A/H1N1 vaccines (Lau et al., 2010), and acceptability of childhood influenza vaccinations (Chen et al., 2011). The usage of the HBM constructs of perceived susceptibility and perceived severity are associated with individuals engaging in recommended protective behaviors (Bish & Michie, 2010). The constructs of perceived barriers and perceived benefits have been successfully utilized to predict the utilization of influenza vaccines (Chen, Fox, Cantrell, Stockdale, & Kagawa-Singer, 2007). In addition, perceived travel risk, subjective knowledge, and socio-demographic factors were added to the model to explore the roles of the aforementioned determinants of travel avoidance based on previous studies (Floyd, Gibson, Pennington-Gray, & Thapa, 2003).

3.2. Perceived travel risk

Risk perceptions have long been scrutinized within the tourism literature (Hales & Shams, 1991; Roehl & Fesenmaier, 1992). Risk is typically denoted as the shock, threat, and crises that can negatively impact the tourism industry (Law, 2006). Additionally, risk is often defined as what is perceived and experienced by visitors during the process of purchasing and consuming services in the destination (Tsaur, Tzeng, & Wang, 1997; Reisinger & Mavondo, 2005). To date, risk has been consistently found to be a major concern for international visitors (Yavas, 1990; Pine & McKercher, 2004; Schroeder, Pennington-Gray, Kaplanidou, & Zhan, 2013).

Prior studies revealed that tourists' risk perceptions are multifaceted and depend on visitors' characteristics. Roehl and Fesenmaier (1992) classified tourists into three risk perception groups: risk neutral, functional risk, and place risk. The risk neutral visitors refer to those who do not perceive travel as risky. The functional risk visitors consider the

possibility of mechanical, equipment, and organizational risk. The place risk group, on the other hand, perceived travel as being risky. Furthermore, perceptions of risk might also be affected by individual personality (Carr, 2001) and nationality (Seddighi & Theochaous, 2001).

Perceptions of risk depend on the type of risk perceived (Reisinger & Mavondo, 2005; Yuksel & Yuksel, 2007). There are seven risks frequently discussed in the consumer behavior literature: financial, functional, physical, social, psychological, satisfaction, and time (Schiffman & Kanuk, 1991). Roehl and Fesenmaier (1992) later identified three dimensions of perceived risk: physical/equipment risk, vacation risk, and destination risk. Sonmez and Graefe (1998) identified four types of risks as most often associated with tourism: financial, psychological, satisfaction, and time. Similarly, Maser and Weiermair (1998) classified travel-related risks into several categories including, but not limited to: natural disasters, hygiene and diseases, crime, and accidents. Richter (2003) added health concerns as another category. These risk factors have been widely examined and consistently found to increase visitors' level of perceived destination risk (Larsen, Brun, & Øgaard, 2009; Pizam & Mansfeld, 1996). Moreover, Barton (1994) classified 12 possible types of disasters that could affect visitors; three of them were related to natural environments, bacterial infection, and terrorist or war-related activities.

As indicated, notwithstanding some exceptional situations, visitors typically mitigate their risks when traveling (Law, 2006). Past studies have frequently shown that the tourism industry is often vulnerable because of direct or indirect incidents that might impede the safety of visitors (Maser & Weiermair, 1998; Seddighi & Theochaous, 2001; Elsrud, 2001). In their study, Leggat and Klein (2001) found that visitors often become anxious and largely depend on the destinations and the host communities for support when something goes awry. To date, there are several studies that have been conducted in the area of risk and travel decision making that demonstrate declines in tourism demand. For instance, the Bali bombings (Wilks & Moore, 2003), SARS and bird flu in Asia (Pine & McKercher, 2004), tsunami in Southeast Asia (Morison, 2005), and the Olympic Games in London (Schroeder et al., 2013) all have been studied in reference to travel and destination risk.

Sonmez and Graefe (1998), for instance, found that perceived risk is a significant predictor of avoiding certain destinations. Likewise, Buttle and Bok (1996) found that environmental influences could affect consumer behavior. Other studies have confirmed that risk perceptions are pivotal factors that influence visitors' travel decisions. When individuals perceive that potential risks outweigh benefits, they are more likely to modify their travel to the destination. In turn, this negatively affects tourism-related businesses and images associated with destinations. Implications of SARS show how a region's economy can be impacted as a consequence of fear of contracting a disease (Yanni, Marano, & Han, 2010).

Leggat et al. (2010) found that while the outbreak of H1N1 in 2009 was of some concern to more than half of the residents of Queensland, Australia, a majority of respondents would not have postponed travel even if they exhibited symptoms consistent with the pandemic. Although a majority of this research is case-based, continuous research in the area of pandemics, risk, and travel is critical to providing information for the tourism industry to better respond in times of health-related crises.

4. Methods

An online survey was administered to over 2000 random adults in the U.S. in October 2014. Respondents spent an average of 13 min to complete the survey. A Dillman online survey procedure was used to increase participation (Dillman, Smyth, & Christian, 2009). This included two reminder emails. In the end, a total of 1613 completed surveys were available for this study.

4.1. Construct operationalization

There were six independent variables in this study. First, perceived travel risk associated with Ebola was measured using 11 statements on a 5 point Likert scale with 1 = *strongly disagree* and 5 = *strongly agree*, which were adapted from Lee et al. (2012). Second, perceived susceptibility was measured using five statements measuring the level of the perceived susceptibility associated with Ebola using a 5 point Likert scale with 1 = *strongly disagree* and 5 = *strongly agree*, that were adopted from Buglar et al. (2010). Third, perceived severity was measured with four statements measuring the level of the perceived severity associated with Ebola with 1 = *strongly disagree* and 5 = *strongly agree*, that were adopted from Akompab et al. (2013). Fourth, self-efficacy was measured using five statements regarding an individual's self-efficacy associated with Ebola with 1 = *strongly disagree* and 5 = *strongly agree*, that were adopted from Lee et al. (2012) and Anagnostopoulous, Dimitrakaki, Niakas, and Tountas (2013). These items were adapted to measure the associated construct due to relevancy and robustness. Fifth, subjective knowledge was measured by asking respondents to rate their knowledge associated with Ebola on a 5 point Likert scale where 1 = *not at all knowledgeable* to 5 = *very knowledgeable*. Sixth, sociodemographic factors were measured by asking respondents their age, gender, education, household income, and frequency of past international travel. The dependent variable was measured by one question on the likelihood of avoiding travel within the U.S. due to the recent Ebola cases on a 5 point Likert scale of 1 = *extremely unlikely* to 5 = *extremely likely*.

4.2. Data analysis

Multi stage data analysis was used to answer the research questions in this study. First, descriptive analysis was used to examine the spread and normality of the data. Second, reliability tests were conducted to ensure the consistency of the items. Finally, an ordered response model (McKelvey & Zavoina, 1975) was employed to relate the likelihood of travel avoidance within the U.S. to the aforementioned independent variables. The model recognized the inherent ordering in the outcome variables of interest and allows for calculation of the probability of each level of outcome as a function of explanatory factors. A statistical analysis was performed using the SPSS 22 package.

5. Results

5.1. Profiles of respondents

Of the 1613 completed surveys, males represented 47.3% of the sample and females represented 52.7%. The average age was 47 years old with the youngest age of 19 and the oldest age of 87. Approximately 36% had college degrees and 21.3% had some college credit. Those with advanced degrees represented 18% of the sample. The sample was skewed toward Caucasians, who represented over 87% of the sample, which calls for caution in interpreting the data. Those with a 2013 annual household income of between $50,001 and $75,000 represented 21% of the sample, while 18% of the sample earned $75,001 to $100,000 in 2013. A majority of the sample (73%) had not traveled internationally within the past 12 months. Over 75% of respondents indicated that they were somewhat knowledgeable about Ebola (M = 3.31, SD = 0.95) and that they were slightly comfortable flying domestically (M = 3.50, SD = 1.35). Table 1 outlines the key sociodemographic factors of our sample.

5.2. Reliability test results

We were interested in the possibility of creating a composite score from the items. Thus, we tested the unidimensionality with reliability tests. Principal component analyses were also conducted and yielded

Table 1
Sociodemographic factors.

Variable	Number	Percent
Age Mean = 47	1613	
Youngest = 19		
Oldest = 87		
Gender		
Male	763	47.3
Female	850	52.7
Education		
Less than high school	23	1.4
High school	237	14.7
Some college	344	21.3
College degree	585	36.3
Advanced degree	291	18.0
Some graduate school	82	5.1
Technical school	51	3.2
Race and ethnicity		
Caucasian/white	1418	87.9
Black/African American	45	2.8
Asian	60	3.7
Native Hawaii/Pacific Islander	3	0.2
Hispanic/Latino	45	2.8
American Indian/Alaskan Natives	9	0.6
Multi ethnic/mixed race	15	0.9
Other	18	1.1
2013 household income		
Under $24,000	171	10.6
$24,001–$35,000	174	10.8
$35,001–$50,000	247	15.3
$50,001–$75,000	339	21.0
$75,001–$100,000	290	18.0
$100,001–$125,000	178	11.0
$125,001–$150,000	95	5.9
Above $150,000	119	7.4
International travel		
None	1185	73.5
More than 1	428	26.5

Subjective Ebola knowledge on a 1–5 scale (Not at all knowledgeable –very knowledgeable) M = 3.31 (SD = 0.95).
Comfort of flying domestically on a 1–5 scale (very uncomfortable – very comfortable) M = 3.50 (SD = 1.45).

similar results. Reliability tests indicated that all scales had high Cronbach alphas with 0.91, 0.93, 0.80, and 0.87 for perceived travel risk, perceived susceptibility, perceived severity, and self-efficacy scales respectively, which indicated the unidimensionality of the scales. Therefore, a composite score for each scale was created. Table 2 outlines the results of the reliability test for perceived travel risk. Table 3 presents the results of the reliability test for perceived susceptibility. Table 4 presents the results of the reliability test for perceived severity. Table 5 presents the results of the reliability test for self-efficacy.

On average, respondents demonstrated low perceptions of risk on all items. Although the sample indicated that international travel seemed riskier than domestic travel, most respondents agreed that Ebola is a very frightening disease. This is partly explained by the fact that more than half of our sample have never traveled internationally before. The overall mean score for perceived risk was 2.88, indicating an overall low perception of risk associated with Ebola. The overall mean score of the perceived susceptibility scale was 2.00, indicating low perceived susceptibility related to Ebola in general.

The overall mean score for the perceived severity construct was 3.12, which indicated the relative neutrality of the respondents. Nonetheless, it is also important to note that, on average, the respondent also agreed that if they test positive for Ebola, they could pass it to their family and friends who may die because of it.

The overall mean score for self-efficacy was 3.62, indicating a relatively high self-efficacy among our respondents. Likewise, the mean score for subjective knowledge was 3.31(SD: 0.95), indicating relatively neutral subjective knowledge related to Ebola.

5.3. Ordered Response Model results

In the Ordered Response Model, a positive parameter indicated that the corresponding variable was associated with a higher likelihood of avoiding travel in the U.S. due to the recent Ebola cases and a negative parameter indicated the opposite effect. The parameters of the model were estimated using the maximum likelihood estimator. The −2 Log likelihood at convergence was 3515.222 ($\chi^2 = 1152.526$, df = 9, sig. = 0.001), indicating a significant improvement from the baseline model. The model with all independent variables accounted for 55% of the variance in the likelihood of travel avoidance. Table 6 outlines the results of the ordered response model.

Related to Research Question 1, the model indicated that there was a positive relationship between perceived travel risk and travel avoidance ($\beta = 1.450$, $p = 0.001$), with those who held higher risk perceptions related to travel showing a higher propensity to avoid travel due to Ebola cases. For Research Question 2, the model indicated that there was a positive relationship between perceived susceptibility and avoiding travel due to Ebola cases ($\beta = 0.584$, $p = 0.001$). As such, those who indicated a higher susceptibility to Ebola also demonstrated a higher propensity to avoid travel.

For Research Question 3, the model revealed no significant relationship between perceived severity and the likelihood of travel avoidance ($\beta = -0.041$, $p = 0.58$). For Research Question 4, the model revealed a negative relationship between self-efficacy and the likelihood of travel avoidance ($\beta = -0.311$, $p = 0.001$). That means those with lower self-efficacy were more likely to avoid travel due to Ebola. Regarding Research Question 5, the model found a positive relationship between subjective knowledge and the likelihood of travel avoidance ($\beta = 0.228$, $p = 0.001$), with those exhibiting higher levels of subjective knowledge being more likely to avoid travel due to Ebola.

Table 2
Perceived travel risk.[a]

Item	Mean	SD	Cronbach's Alpha
Perceived travel risk			0.91
• Traveling in the U.S. is risky right now.	2.53	1.19	
• I would feel very comfortable traveling in the U.S. right now.	2.34	1.14	
• Domestic travel is just as risky as international travel right now.	2.70	1.16	
• Because of Ebola, domestic air travel should be avoided right now.	2.40	1.17	
• Because of Ebola, international air travel should be avoided right now.	3.17	1.27	
• I am concerned about Ebola during travel by air right now.	2.78	1.25	
• I am not concerned about contracting Ebola during travel by air right now.	2.80	1.27	
• It is dangerous to travel internationally by air right now because of Ebola.	3.14	1.23	
• People around me seem to refrain from domestic air travel right now because of Ebola.	2.63	1.09	
• People around me seem to refrain from international air travel right now because of Ebola.	2.92	1.13	
• Ebola is a very frightening disease.	4.24	0.91	

1 = *strongly disagree* to 5 = *strongly agree*.
[a] All 1613 responded to the above survey items.

Table 3
Perceived susceptibility.[a]

Item	Mean	SD	Cronbach's Alpha
Perceived susceptibility			0.93
• My chances of being exposed to Ebola are high.	1.88	1.01	
• It is likely that I will contract Ebola if I travel in the next few weeks.	1.86	0.98	
• It is likely that I will be exposed to Ebola if I travel in the next few weeks, but I will not get sick.	1.99	1.00	
• It is likely that I will contract Ebola if I travel in the U.S. by air in the next few weeks.	1.96	1.05	
• It is likely that I will contract Ebola if I travel internationally by air in the next few weeks.	2.32	1.17	

1 = *strongly disagree* to 5 = *strongly agree.*
[a] All 1613 responded to the above survey items.

Research Question 6, which focused on sociodemographic factors, yielded interesting findings. The model found a negative relationship between age and the likelihood to avoid travel ($\beta = -0.014$, $p = 0.001$), with younger age groups showing a greater propensity of travel avoidance due to Ebola. The model also indicated a positive relationship between gender and travel avoidance ($\beta = 0.324$, $p = 0.002$), with females being more likely to avoid travel due to Ebola. No significant relationship was found between frequency of international travel and the propensity to avoid domestic travel ($\beta = 0.008$, $p = 0.387$). This is probably due to the fact that a majority of the respondents had not previously traveled internationally.

6. Discussion

Previous emerging infectious disease outbreaks such as severe acute respiratory syndrome (SARS) or H1N1 influenza pandemic have had far reaching impacts on travel and tourism, specifically with enhanced health screenings and increased travel delays due to the shutdown of airline travel. While the Ebola outbreak has arguably not had the same impacts, concerns have been raised by travelers and government travel advisories. In this study, more than half of our sample indicated that they had concerns regarding Ebola during travel by air and more than half also indicated that they would not avoid traveling in light of recent Ebola cases in the U.S. This is consistent with the fact that airlines in the U.S. remained operational during the outbreak and that while the U.S. government did designate several airports for passenger screening, especially those traveling back from African countries which includes New York's John F. Kennedy, Chicago's O'Hare, Atlanta's Hartfield-Jackson, Newark's Liberty, and Washington's Dulles Airport, the U.S. government travel advisories did not affect both international and domestic air travel. These findings are also consistent with a survey conducted by the Global Business Travel Association, which indicated that most respondents said the outbreak has had a minimal effect on business travel (Martin, 2014). As such, the quick reactions by the U.S. government to respond to the potential outbreak in the U.S. may have influenced travelers' decisions related to travel and curtailing their travel. Another possible reason is that we only asked respondents about their travel avoidance related to domestic travel (within the U.S.). As such, using international travel as a dependent variable may have yielded different results.

Table 4
Perceived severity.[a]

Item	Mean	SD	Cronbach's Alpha
Perceived Severity			0.80
• If I get sick from Ebola, I will die.	2.87	1.00	
• I am afraid that I may die if I contract Ebola.	3.34	1.10	
• If I test positive for Ebola, I could pass it to my family and friends who may die.	3.64	1.01	
• I am at greater risk of dying if I contract Ebola because of my general health.	2.63	1.15	

1 = *strongly disagree* to 5 = *strongly agree.*
[a] All 1613 responded to the above survey items.

The findings revealed several predictors that may affect domestic travel avoidance in light of Ebola cases, many of which were conflicting in nature and undocumented in the literature on travel risk and contagious diseases. The strongest predictor was perceived travel risk associated with Ebola, with those with higher perceived levels of risk having shown a greater propensity to avoid travel within the U.S. In one study, respondents who viewed themselves at increased risk for SARS were more likely to take precautionary actions to avoid contracting the disease (Brug et al., 2004). In another study, respondents with feelings of high perceived susceptibility were more likely to take preventive measures against the human avian influenza (de Zwart, Veldhuijzen, Richardus, & Brug, 2010).

The findings were largely parallel with previous studies using HBM. For instance, those with higher self-efficacy related to adhering to preventive measures were less likely to avoid travel to locations that are being impacted by infectious diseases. Individuals who reported higher feelings of self-efficacy reported lower levels of susceptibility in acquiring transmissible diseases (Liao, Cowling, Lam, Ng, & Fielding, 2010). This could be explained by the fact that these individuals may strongly believe that since they have control over behavior choices associated with an ailment, they are at a lower risk for transmission.

Interestingly, the study found no significant relationship between perceived severity and travel avoidance. Chen et al. (2011) found that perceived severity was not associated with caregivers seeking influenza vaccinations for their children. A previous study reported that participants' perceived severity of H1N1 did not predict their acceptability of a vaccine for the malady (Coe, Gatewood, Moczygemba, Goode, & Beckner, 2012). Contrary to our findings, several previous studies have confirmed opposite findings. Individuals believing that avoiding travel, especially to places experiencing an epidemic, will help prevent their risk of acquiring the disease (Lau, Griffiths, Choi, & Tsui, 2009). A possible explanation is that while perceived susceptibility of being exposed to Ebola might be steady over time, perceived severity might decrease with increases in knowledge of the disease.

Some studies have found that anxiety associated with a disease may lead some individuals to report lower use of preventive measures (Cowling et al., 2010). Healthcare workers who believed that a vaccine for influenza A (H1N1) was effective were more likely to take it (Seale et al., 2011). Knowledge or previous experiences with vaccines may also lead to the use of vaccines or other preventive measures (Arda et al., 2011).

The current study yielded an interesting finding between the positive relationship between travel avoidance and being female. Perhaps women who perceived more risk from infectious diseases (Brug et al., 2004) may be more likely to act upon those preventive measures adding to increased feelings of self-efficacy. Another possibility is that women, due to their "ethic of care" might be more concerned with becoming sick or having their loved ones become sick. This is an interesting finding which might yield unique results due to the context of a health risk. In contrast to our findings, one study found that women reported lower levels of self-efficacy to engage in protective methods against influenza when compared to men (de Zwart et al., 2007). Understanding differences among men and women in a travel health risk context might

Table 5
Self-efficacy.[a]

Item	Mean	SD	Cronbach's Alpha
Self-Efficacy			0.87
• I am confident that I can understand health instructions about Ebola prevention.	3.94	0.882	
• I knew what activities could prevent contracting Ebola.	3.63	0.94	
• I am confident that I am able to take action to prevent contracting Ebola.	3.70	0.90	
• I am able to identify the symptoms of Ebola.	3.26	1.04	
• I know what to do if I suspect I am exposed to Ebola.	3.57	1.02	

1 = *strongly disagree* to 5 = *strongly agree.*
[a] All 1613 responded to the above survey items.

provide valuable messaging and targeting information for Destination Management Organizations and members of the travel industry.

Is the risk of contracting a disease a major concern for travelers? According to a study looking at Americans' fears and worries about living outside of the country, this may not be true. American students traveling abroad cited fears associated with contaminated food and water, psychological distress, excessive sun exposure, and physical/sexual assault over fears of contracting certain infectious diseases (e.g. Ebola, the plague) (Hartjes, Baumann, & Henriques, 2009). The avoidance of public transportation is cited as one of the most utilized preventive measures to avoid contracting an infectious disease (Sadique et al., 2007). Thus, understanding differences in residence and travel history and frequency might provide revealing information that may help the travel industry better manage messages targeted toward tourists.

The current study yielded results which indicated that individuals who reported having low levels of self-efficacy were more likely to avoid travel. Self-efficacy plays an important role in whether one chooses to adopt a behavior, specifically a health behavior. Perceived positive outcomes of a behavior were associated with greater confidence in performing the behavior (Maddux, Sherer, & Rogers, 1982). High levels of perceived self-efficacy correlated with an increased willingness for individuals to adopt healthy preventive behaviors (e.g. exercise habits) (Kelly, Zyzanski, & Alemagno, 1991).

These findings have important consequences for public health and travelers. Although this study did not look at specific travel-related preventive measures against Ebola, public education in the U.S. has focused on simple measures, such as hand washing, which travelers could utilize as a preventive measure for Ebola. These findings can also help public health officials to focus education efforts for both international and domestic travelers, especially those who showed higher concern over the outbreak, and might be appropriate audiences for targeted information. Examples of this include providing information in airports, in airport bathrooms, on online tickets, in hotel rooms, and so forth.

Subjective knowledge was found to be positively associated with travel avoidance. This may be partly explained by the relationship between knowledge and the likelihood of anticipated complacence with public health recommendations. As such, greater understanding of Ebola may result in a better command of public health recommendations. Perhaps more imperative, older participants appeared less likely to cancel their travel. Several other studies have noted greater perceived severity of health diseases (Barr, Raphael, & Taylor, 2008), which may in part explain the greater acceptance of public health measures among our sample. As such, they may be proper targets for both public health education and in-coming traveler screening.

There are critical implications from this research. The findings can help policymakers identify issues of high concern among travelers that require management actions, as well as to recognize potentially contentious issues that will require special effort. For example, the role of travel insurance and pre-travel expenses (e.g., nonrefundable hotel booking fee) in influencing travel avoidance. Public perceptions of Ebola have changed during the events surrounding the 2014 outbreak. Our results may support future efforts to evaluate changes in attitudes and perceptions toward the outbreak among travelers due to awareness of 2014 Ebola screening measures at several U.S. ports of entry and Ebola more generally.

The study was limited in that it relied on an online survey to collect data at a time when the outbreak was salient. The survey was conducted in October of 2014 during the height of the Ebola outbreak, during which time the U.S. public was bombarded with media coverage of the outbreak that might have shaped their perceptions. Thus, it may be challenging to generalize the results of the study beyond the time due to the prevalence of information in the media regarding this crisis. Ibuka et al. (2010) also noted that perceptions of disease changed over time along with the media coverage. Specifically, the decline in the engagement in the preventive health strategies (in this case travel avoidance) may also mirror the decline in media attention regarding Ebola in the United States. As such, further study should explore how perceptions of Ebola and other pandemics changed over time and how it relates to media attention, as well as engagement in the recommended health preventive strategies. The survey also relied on self-reported data with its inherent bias, as what respondents report may differ from what they actually do.

Table 6
Summary of Ordered Response Model.

Variable	Parameter estimate	Significance
Perceived travel risk	1.450	0.001*
Perceived susceptibility	0.584	0.001*
Perceived severity	−0.041	0.58
Self-efficacy	−0.311	0.001*
Subjective knowledge	0.228	0.001*
Age	−0.014	0.001*
Female [ref: male]	0.324	0.002*
Frequency of international travel	0.008	0.387
Thresholds		
Avoid travel = 1	4.062	0.001
Avoid travel = 2	5.530	0.001
Avoid travel = 3	7.449	0.001
Avoid travel = 4	8.635	0.001

−2 Log likelihood at convergence (n = 1613) 3515.222 ($\chi 2 = 1188.493$, df = 9, sig. 0.001) Pseudo R^2Negelkerke = 0.551.
* Sig < 0.05

7. Conclusion

We believe that the variables identified by respondents regarding travel avoidance due to the Ebola outbreak were relevant. Our results indicated that most respondents considered Ebola to be serious and would take protective measures in response to the outbreak. However, most of them also demonstrated a minimal plan to avoid travel which is parallel with other studies on contagious pandemics. The adapted Health Belief Model helps us to understand this phenomenon. As predicted by the model, those with higher perceptions of risk, perceived susceptibility, and subjective knowledge were found to be more likely to avoid domestic travel, while those with higher levels of self–efficacy demonstrated a lower propensity to avoid travel due to Ebola. It is important to note that the study did not specifically examine the role of "cues to action." This is not to say that the construct is not important. Rather, we were interested in examining the roles of other constructs

in the Health Belief Model. Therefore, it is recommended that future research includes "cues to action" in the model to determine the role of the construct.

Finally, due to the multifaceted nature of the issues, further study needs to be conducted to fully understand the complexity of attitudes toward contagious diseases. Additionally, further research could also explore the relationship between the attitudes and perceptions of travelers and travel destinations. Given the improbability surrounding how the 2014 Ebola outbreak may (re)emerge in the future, our results may contribute in planning for and responding to crises in the context of air travel. For instance, travelers may have also considered other logistic costs, such as fees for changing a travel itinerary or extending planned accommodations, as part of decision making in travel avoidance. Although not directly measured in our study, such factors might influence their attitude toward travel avoidance in the wake of Ebola or other pandemics, which warrant further exploration.

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Dr. Ignatius Cahyanto is an Assistant Professor at Black Hills State University in South Dakota. His research interest is centered around crisis management for the tourism industry. He is particularly interested in understanding tourists' behavior in the event of crises.

Michael Wiblishauser, Ph.D., CHES is an Assistant Professor of Health Education at Lock Haven University, Lock Haven Pennsylvania. His research interests include substance use prevention & treatment, violence prevention, and health disparities.

Dr. Lori Pennington-Gray is the current Director of the Tourism Crisis Management Institute at the University of Florida. Her research primarily focuses on crisis management strategies for the tourism industry.

Ashley Schroeder, Ph.D. is an Assistant Professor at the University of Hawaii at Manoa's School of Travel Industry Management and Managing Director of the University of Florida's Tourism Crisis Management Initiative. Ashley has expertise in destination management and her primary research interest is tourism crisis management.