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# Risk perception of food safety and behavioral intentions to read food safety labels

Weiwei Miao  
*Iowa State University*

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**Risk perception of food safety and behavioral intentions to read food safety labels**

by

**Weiwei Miao**

A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
MASTER OF SCIENCE

Major: Journalism and Mass Communication

Program of Study Committee:  
Suman Lee, Major Professor  
Gang Han  
Sarah L. Francis

Iowa State University

Ames, Iowa

2014

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## NOMENCLATURE

PMT	Protection Motivation Theory
GM	Genetically Modified
GAP	Good Agriculture Practices
PSA	Public Service Announcement
IRB	Institutional Review Board

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## ABSTRACT

Food safety incidents occur frequently in China. Chinese people's health is at risk due to the variety of Chinese food safety problems. The Chinese government has enacted many programs and policies to address this issue. The purpose of this study was to understand how Chinese college students perceive these food safety risks and what motivates them to take preventative measures toward reducing their risk. To better understand Chinese college students' perception and their behavioral intention related to food safety, this study tested the relationships between threat appraisal (severity and vulnerability) of food safety and behavioral intention to read food-safety labels and buy food with food safety labels, coping appraisal (response efficacy and self-efficacy) and behavioral intention to read food-safety labels and buy food with food safety labels in Protection Motivation Theory. Chinese students in a large Midwestern university were recruited via an email invitation to take an online survey asking about their perception of food safety in China and their intentions to read food-safety labels and buy food with food safety labels. Data were analyzed using Statistical Package for the Social Sciences (SPSS) 22.0. Positive relationships were detected between severity, vulnerability, response efficacy, self-efficacy and behavioral intention. Severity was the strongest factor ( $\beta = .365, p < .01$ ) that influenced behavioral intention in this study after controlling for knowledge and mass media dependence. These outcomes suggested that Chinese college students' intentions to read food-safety labels and buy food with food safety labels were increasing as their perception about food safety went up. Meanwhile, they were

more likely to follow the recommendations to read food-safety labels and buy food with food safety labels when severity of food safety was stressed.

## CHAPTER I

### INTRODUCTION

Food safety has been a serious issue in China for a number of years. Examples of recently-exposed food-safety related incidents include melamine milk powder, poisonous yogurt, expired cake powder, fake stewed pig ears (Zheng, 2012), fake eggs, etc. Qi (2012) states that current threats to Chinese food safety fall into three aspects: inedible products and additives, raw materials, and transgenic technology. A lack of control with respect to the use of excessive chemicals also poses health problems in China (Calvin, Gale, Hu and Lohmar, 2005). Calvin, et al., (2005) points out that the Chinese agricultural marketing system is fragmented, and presence of small undocumented traders operating on a cash basis makes tracking difficult. Occurrence of water pollution and low-quality seafood has also exerted pressure on the aquatic food-export industry (Liu, Kerr and Hobbs, 2012). Moreover, the presence of genetically modified (GM) food, the benefits and risks of which have long been under debate in different countries, has elevated consumer concern (Rodriguez and Abbott, 2009). Despite the fact that China has a high rate of acceptance of GM food, and GM food are considered as safe, there are still many who raise concerns

regarding potential harm from its use (Chakraborty, 2010; Huang, 2006). Food safety is a serious issue because of its effects on both consumer health and related socioeconomic and political factors (Liu, Xie, Zhang, Cao and Pei, 2013). The frequency and widespread impact of food safety incidences in China, has negatively impacted China's reputation in terms of food exports (Liu, Kerr & Hobbs, 2010). For example, the European Union (EU) imposed an import ban because of the overused pesticides; later, the United States (US) closed the import of several aquatic foods from China, such as catfish, shrimp etc. (Liu, Kerr & Hobbs, 2010).

Some research studies have examined regulations initiated by the Chinese government to deal with these problems (Ortega, Wang, Olynk, Wu and Bai, 2012). To reduce these threats, the Chinese government has established both a uniform food-safety regulatory system and a supervisory system that establishes its strict enforcement (Qi, 2012). Liu, et al., (2013) has discussed that risk analysis is the most effective tool used to manage food safety.

The Chinese government has made significant efforts to ensure that the Chinese people have access to safe food. In addition to regulation of the food industry, consumers are also encouraged to protect themselves by reading government-provided labels of certification. Despite such efforts to ensure a safe

supply, few studies have examined the effectiveness of food-safety labeling with respect to consumers' perceptions. This study intended to utilize Protection Motivation Theory (PMT) to examine Chinese college students' perceptions and their intentions of engaging in protective behavior with respect to food-safety health risks (reading food labels and purchasing products with these labels).

The first goal of this study was to examine the relationship between Chinese college students' perceptions with respect to food safety (severity, vulnerability, self-efficacy and response efficacy) and their intentions to read the food-safety labels regulated by the Chinese government. The second goal was to determine which factor in Protection Motivation Theory has the strongest influence on such intentions.

Encouraging people to use food-safety labels to make food selection seems to be a safe and easy step toward increasing general food safety. Hoban and Leiss (1991) stated that recognizing sources of information related to risk is the most important way to understand peoples' perceptions of risk. Mass media, including printed news, broadcast news and social media (particularly in present days), is a main resource from which people receive food-risk and health information (Slovic, 1987; Hoban, 1991; Bearth, Cousin and Siegrist, 2013) and such media contribute by setting a discussion agenda (Hoban, 1991). Therefore,

finding an efficient way to educate and guide people towards proper methods for protecting themselves is essential. This study identifies a possible approach that could be used by the Chinese government in choosing an effective way to inform the public. It also provides a theoretical basis for those advertisers who develop Public Service Announcements about food-safety issues focused on persuading Chinese college students to change their attitude and behavior with respect to food safety. It also provides a possible approach that Chinese students might use to obtain knowledge about reading food-safety labels and thereby protect themselves.

## CHAPTER II

### LITERATURE REVIEW

#### Food-Safety Problems in China

Food safety is a serious problem in China, in large part because of wide use of chemical fertilizers and highly-toxic pesticides. Contamination continues to be a problem due to increased industrialization of agriculture and lack of a powerful controlling authority (Calvin et al., 2006). Ebenstein (2011) pointed out that the amount of fertilizer used in China is more than twice the global average. In addition to such overuse of fertilizers, food contamination has exceeded use of farm chemicals as a major concern in recent years (Calvin et al., 2006).

Qi (2012) pointed out that there are three main factors threatening Chinese food safety: first, inedible industrial materials are used as additives to enhance the color, taste, and duration of preservation. Second, advanced industrial raw materials (contaminants) are substituted into food production to reduce price (Qi, 2012). In 2008, a well-known dairy corporation used melamine, a chemical that can be used in manufacturing of packaging for food but not approved for direct addition to food (U.S. Food and Drug Administration), as a substitute for protein in milk powder, resulting in the widespread illness of

300,000 people and ultimately to the deaths of six infants (Ramesh, 2010; Zhang, 2010). Other food-safety issues related to use of added contaminants include Sudan Red Dyne eggs (Ramesh, 2010), industrial gelatin-tainted yogurt (Xinhua Economic News, 2012), etc. Third, products of modern technology such as genetically modified (GM) food have raised new concerns about food safety (Qi, 2012). The risks in consuming such food are still under worldwide debate (Rodriguez et al., 2009). China is one of the leading countries to introduce “a GM crop commercially and [is] currently the 6th largest producer of biotechnology enhanced plants based on total acreage” (Chakraborty, 2010. p. 4). Though research has shown that Chinese consumers are somewhat more supportive of use of GM foods than those in other countries, Chinese attitudes vary widely (Chakraborty, 2010; Huang, 2006).

Another serious problem related to Chinese food safety is weak Chinese government supervision. After a series of scandals, “Chinese people have serious doubt on the government food safety system standards which is incomplete, inspection is weak, and regulations are not strictly enforced” (Chakraborty, 2010, p. 4).



## Chinese Government Food-Safety Policy

The first law related to food safety is the Food Hygiene Law, which is published by Legislative Affairs Office of the State Council in 1995 to ensure food safety, public health and life safety. The Food Hygiene Law regulated food for both quality and environment. It set hygienic standards for the food industry to produce food properly and also brought up supervision methods and processes as well as punishment.

Food Hygiene Law was enacted to meet the needs at the time it was developed; however, the rapid development of the Chinese economy has increasingly forced China to adopt additional laws regarding food quality and supervision (Zhang, Xie, Zuo, Ding and Pei, 2010). Because of these concerns, a series of measures related to national standards, certification systems, and supervision based on food-safety laws has been enacted (Ortega et al., 2012; Ramzy, 2009; Wang, Mao and Gale, 2008). For example, the new Food Safety Laws of 2009 (Legislative Affairs Office of the State Council, PR China, 2009) intensified enforcement and monitoring of food safety standards (Ramesh, 2010). The Product Quality Law (enacted in 1993, amended in 2000) and the Agricultural Production Safety Law (2006) are two other basic food safety laws in China; others such as the Food Producing Manufacturer Quality and Safety

Supervision Regulation, the Food Label Regulation, etc., have been enacted to supplement local regulations (Ramesh, 2010).

The government has also been working on regulating food safety in several areas. For example, the Ministry of Agriculture (MOA) is the main institution in charge of primary agricultural products (Zhang et al., 2010), and the 2006 Agricultural Production Safety Law provides a national framework for building a system for regulating agricultural products (Calvin et al., 2006). Three separate laws, the Fisheries Law, the Marine Environmental Protection Law, and the Law on the Prevention and Control of Water Pollution (China Environment Forum, 2008), were put into action to strengthen regulation of aquatic food (Liu et al., 2012). Meanwhile, several special institutions are also taking charge of specific aspects of food safety. For example, the Administration of Quality Supervision, Inspection, and Quarantine of the PRC (AQSIQ) is responsible for manufacturing and processing, and the China Food and Drug Administration (CFDA) is responsible for "general supervising, harmonizing, investigating and prosecuting serious food safety accidents" (Zhang et al., 2010, p. 16). To strengthen the regulatory system, the Ministry of Commerce plays the role of controlling food circulation, and the Ministry of Environmental Protection takes charge of pollutant inspection and control (Zhang et al., 2010).

## China's Food-Safety Labels

Because of concern about the importance of food-safety issues, the Chinese government has taken a series of measures to expand existing laws and policies and reduce Chinese consumers' concerns about food quality and safety (Yin, Wu, Du, Chen, Ni and Buckle, 2010; Liu et al., 2013). The Chinese government provides certification, including the harmless agriculture product, green, organic, and good agriculture practices (GAP), for food that has been inspected and approved (Yin et al., 2006; Liu et al., 2013). Table 1 illustrates four food-safety labels currently used by the Chinese government for such certification.

The promotion of harmless agriculture products is viewed as the most visible improvement in government regulation (Calvin et al., 2006). A harmless agriculture product designation is authorized by the Center For Agri-food Quality and Safety in the Ministry of Agriculture of the PRC (Liu et al, 2013; Yin et al., 2010). This designation was first used in 2001 and modified in 2003. A harmless agriculture product is qualified as one representing "Controlled and limited use of synthesized fertilizer, pesticide, growth regulator, livestock and poultry feed additive, and gene-engineering technology; no use of pesticide with high toxicity and high residue" (Liu et al., 2013, p. 94; Jia, Liu Wang and Liu 2002; Qin, Li and

**Table 1.** Basic Information about Chinese food safety labels.

Labels	Certificate Authority	Operation year
 <p>Harmless Agriculture Products</p>	The Center For Agri-food Quality and Safety, Ministry of Agriculture of PRC	2001
 <p>Green Food</p>	China Green Food Development Center, Ministry of Agriculture of PRC	1990
 <p>Organic Food</p>	Ministry of Environmental Protection of PRC	2004
 <p>Good Agriculture Praticice</p>	General Administration of Quality Supervision, Inspection and Quarantine of PRC	2005

Note: This table is adapted from Liu, Pieniak and Verbeke. (2013). p. 94.

Qin, 2003).

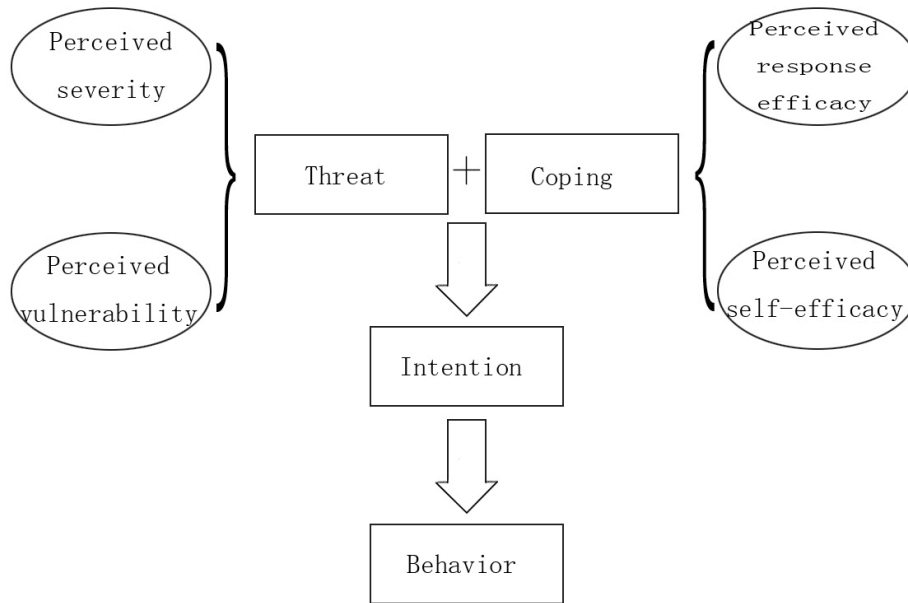
Green Food is a Chinese food term describes the food “with controlled and reduced use of pesticides, together with a testing regime for pesticide residues”(Paull, 2008, p. 48). The Green food label has been authorized by the China Green Food Development Center, Ministry of Agriculture of the PRC (Liu et al, 2013; Yin et al., 2010). This began in 1990, authorizing certificates to be valid for 3 years (Liu et al., 2013; Qin et al., 2003). Green food is described as “Controlled and limited use of synthesized fertilizer, pesticide, growth regulator, livestock and poultry feed additives, and Gene-engineering technology (for A level green food)” (Liu et al., 2013, p. 94; Jia et al., 2002; Qin et al., 2003).

The first certification of organic food advanced by the PRC Ministry of Environmental Protection began operating in 1994 and ceased in 2006 ([www.foodmate.net](http://www.foodmate.net)). The new certificate authority for organic food is the General Administration of Quality Supervision, Inspection and Quarantine of the PRC; it was promulgated at 2004, unified at 2005 (Yin et al., 2010) and has been operating since 1994 with the requirement that it must be renewed every three years. Organic food is qualified as “No use of artificially synthesized fertilizer, pesticide, growth regulator, livestock and poultry feed additive, and gene engineering technology (for organic food and AA level green food)” (Liu et al., 2013, p. 94; Jia et al., 2002; Qin et al., 2003).

The certification of Good Agriculture Practice (GAP) is authorized by the General Administration of Quality Supervision, Inspection and Quarantine of the PRC (Yin et al., 2010). It was officially released at 2005 and operated through 2006, with a maximum period of validity of four years. (Good Agriculture Practice Certification Policy, 2011). It measures the quality and location of crop, livestock, poultry, and aquaculture products (Good Agriculture Practice Certification Policy, 2011).

### Protection Motivation Theory

Protection motivation theory (PMT) was primarily proposed by R.W. Rogers to discuss fear appeal. In Rogers' (1975) first article about PMT, he postulated three components of an event via which people protect themselves based on: (a) the level of perceived severity, (b) the probability of occurrence, and (c) the response efficacy, referring to the recommendation of prophylactic responses. Self-efficacy was later added to this theory as a fourth element used to predict people's behavior (Maddux and Rogers, 1983). Protection Motivation Theory explains the relationship between responses and behaviors related to health risks and behavioral intentions (Figure 1) (Lee, Kilbreath, Sullivan, Refshaug and Beith, 2007).



**Figure 1.** Chart of Protection Motivation Theory. Adopted from Lee et al. (2007). p. 76.

Perceived severity and perceived vulnerability are used to define threat appraisal while perceived response efficacy and perceived self-efficacy are usually viewed as comprising coping appraisal. Such appraisal results in either an adaptive (protection motivation) response or a maladaptive response such as engagement in risky behavior that might threaten an individual's health (Ireland, 2010; Boer and Seydel, 1996). The function of PMT, to predict intentions and health behaviors, has been highly supported in meta-analysis studies (Lee, et al., 2007; Floyd, Prentice-Dunn and Rogers, 2000). Floyd (2000) is committed to the idea that appraisal-mediating processes lead to decision-making. Meanwhile, a decision viewed as an intention should result in actual behavior. Therefore, the

key factor in evaluating the effectiveness of PMT is whether people are willing to follow recommendations (Floyd et al., 2000).

### **Threat appraisal**

Threat is defined as “the extent to which people perceive they are susceptible to the health risk and their perception of the severity of the health risk” (Lee, et al., 2007, p. 76). It is the process through which people assess a risk.

One element of threat appraisal is the severity of the threat, or the degree to which people perceive seriousness of the consequences of a certain behavior (Rogers, 1975). For example, after the recall of melamine milk powder, there was high collective anxiety with respect to food safety. Because it was discovered that some food companies used low-quality materials to reduce costs, people’s general anxiety and doubt with respect to the food industry peaked (Qi, 2012).

Vulnerability, another threat appraisal component, refers to “how likely or how vulnerable an individual believes themselves to be” (Ireland, 2010, p. 308). Viewing cases that have been publicized, such as those of industrial gelatin yogurt and Sudan Red eggs, discloses that the problem of inedible additives has



been related to foods people are eating daily.

The level of severity of a threat and vulnerability to it are two factors that influence the level of fear arousal (Rogers, 1975). According to Rogers (1975), the level of fear arousal has a positive correlation with the strength of persuasion and is likely to be heightened by a threat, so that it could lead to an adaptive response (Ireland, 2010). With ongoing exposure of food-safety problems, fear arousal is driven to a high level. To cope with their fear and prevent themselves from harm, people are more likely to be persuaded by recommendations for a healthy lifestyle. Moreover, Slovic (1997) stated that voluntarily-caused risks are more acceptable than involuntarily-caused risks. That means that people may feel more vulnerable and serious when they encounter involuntary risks such as chemicals in their drinks or food supply (Hoban et al., 1991), so it may be more effective to encourage them to read food-safety labels in such cases.

### **Coping appraisal**

Coping appraisal is “the extent people feel that a particular behavior will protect them from the health risk and whether or not they feel they are able to perform such behavior” (Lee et al., 2007, p. 76). Response efficacy and self-efficacy are the key factors.

Response efficacy is the belief that people evaluate for themselves how effectively a particular response will work (Floyd et al., 2000). By calculating the cost and efficiency of suggested measures, they decide whether or not they would make a recommended adaptive response. This is also where persuasion through providing reasonable recommendations occurs.

Self-efficacy has been generated from Bandura's social cognitive-learning theory to predict behavioral change (Bandura, 1977) In protection-motivation models, self-efficacy, referring to the ability to effectively deal with a threat, is an important factor (Maddux and Rogers, 1983; Stanley and Maddux, 1986; Umeh, 2003). Though people themselves may not be not able to change a current situation with respect to food safety, they do have control over their reaction. However, the extent to which they think they should be able to manage the situation leads to their actual behavior. Wu, Stanton, Li, Galbraith and Cole (2005) believed that "the adoption of a healthy behavior is a temporal process from motivation, to decision, then to action". This means that, after being stimulated by a threat, people are motivated to contemplate, then generate an intention, and finally take action (Wu et al., 2005). With higher self-efficacy, people are more likely to actively seek solutions with respect to food safety problems. Proper recommendations provided at this moment will be more

acceptable. Reading food safety labels is a type of action that may provide consumers with information supporting informed decisions.

Moreover, Lee, et al., (2007) found in a study of compliance with risk advice that coping appraisal played a stronger and more consistent role than threat appraisal in changing protective behavioral intentions. That means that it would be more effective to persuade people to read food safety labels than to merely underline the seriousness of the threat.

### Controlling Variables

#### **Knowledge**

Knowledge is associated with risk behavior change. Once people learned that they have been engaging in unsafe practices, they are more likely to change it (Wilcock, Pun, Khanona and May Aung, 2004). As Goel and Baker (2011) indicated, knowledge affects likelihood towards a certain behavior and susceptibility to perceived risk severity or benefits from recommendations in conformance to a health-belief model (Goel and Baker, 2011; Glanz and Viswanath, 2008).

The study of Takeda, Akamatsu, Horiguchi and Marui (2011) about relationship among food-safety knowledge, beliefs and risk-reduction behavior in

college students showed that knowledge on food safety seriously affects college students' behavior towards identifying food safety information during food selecting. Chakraborty (2010) also argued that consumers evaluate the consumption of certain foods depending on both their knowledge and their risk tolerance.

Previous studies have also shown that knowledge of food safety and recognition of relevant food-safety labels are low. Lack of knowledge and recognition can lead to inability to identify safe food (Liu et al., 2013), and knowledge and understanding of food safety labels may be uncertain (Calvin et al., 2006). As Lee, Rodriguez and Sar (2012) discussed, previous knowledge influences people's behavioral intentions without regard to its actual valence. That means that people's willingness to read labels and buy the food in accordance with the food safety labels is affected by their whole breadth of knowledge.

### **Mass Media Dependence**

Slovic (1987) indicated that people's perception of risk comes mainly from the mass media. Mass media plays an important role in educating people and transmitting information. The study by Shim and his colleagues (2011) regarding

consumer knowledge and food safety perceptions of food additives indicated that consumers consider mass media to be the most effective source of food-safety information. The fear generated from food is an example of “how the media can sway public perceptions of risk” (McClusky and Swinnen, 2011). For instance, consumers obtaining food safety information from the media prefer to buy what they perceived as safer food regardless of the price (Zhang & Wang, 2009; Liu, et al., 2013).

The rapid development of media technology and the growth of new media sources have provided a rich data source and more opportunities for dissemination of risk information (Newkirk, Bender and Hedberg, 2013). Among all the internet users, 83% of them at the age of 18-29 use social network sites to communicate (Duggan and Brenner, 2013). By the year 2012, there had been up to 47% users of social media engaging in social care (The Social Media Report, 2012).

Accordingly, based on the aforementioned factors, this study posits the following hypotheses and a research question:

**Hypothesis 1:** There will be a positive relationship between threat appraisal (H1a: severity and H1b: vulnerability) of food safety and Chinese

college students' behavioral intent to **read food-safety labels and buy food with food safety labels.**

**Hypothesis 2:** There will be a positive relationship between coping appraisal (H2a: response efficacy and H2b: self efficacy) of food-safety labels and Chinese college students' behavioral intent to **read food-safety labels and buy food with food safety labels.**

**Research Question:** Which factor (severity, vulnerability, response efficacy, and self-efficacy) will most influence Chinese college students' willingness to read food safety labels after they experience controlled knowledge of, and mass media dependence about, food-safety policy and labels?

## CHAPTER III

## METHOD

## Sampling and Data Collection

The sample in this survey consisted of Chinese students at a large Midwestern public university. The study was reviewed and approved by the University's Institutional Review Board (IRB). Using a list provided by the registrar's office, 1,790 Chinese students received an email invitation (Appendix A) to complete a twenty-six questions survey via Qualtrics -- an online survey (Bardwel, 2013); 126 students responded (7.0% response rate). All participants provided informed consent (Appendix B). A reminder email was sent one week after the initial email invitation.

## Measurement

*Perceived severity of food-safety issue* refers to the degree to which people perceive the severity of a food-safety issue (Ireland, 2010). To measure perceived severity of food-safety issues, stem words were borrowed and modified from Liu, et al., (2010) and Ortega, et al., (2012). Participants were asked the extent to which they agreed with the following statements: (1) Food

safety incidents happen frequently in China; (2) Unhealthy food is widely spread in Chinese food system; (3) People's health is at risk due to the current Chinese food safety system. The responses to these items were rated on Likert scale (1= strongly disagree, 5= strongly agree) (Appendix C).

*Perceived vulnerability* refers to the extent to which people think the problem would occur to them (Rogers, 1975). Stem words were adapted from Ortega (2012) to measure perceived vulnerability. Participants were asked to answer the following statements: (1) My health can easily be at risk because of unhealthy food; (2) It is quite possible that I will ever get unhealthy food; (3) My health risk is highly related to food safety very due to the current Chinese food safety system. The responses to these items rated on Likert scale (1= strongly disagree, 5= strongly agree) (Appendix C).

*Response efficacy was measured* using adapted statements from Lewis, Watson and White (2010) and Spence, Lachlan, Spates and Lin (2013).

Participants were asked to respond to the following statements: (1) Reading these food safety labels helps prevent choosing unsafe food; (2) These food safety labels provide me with useful information on purchasing safe food; (3) Reading these food safety labels relieves my concern about food safety. The



responses to these items were rated on Likert scale (1= strongly disagree, 5= strongly agree) (Appendix C).

*Self-efficacy* refers to the extent to which people think they can successfully perform the recommended behavior. To measure self-efficacy, stem words were borrowed and modified from Leach, Hennessy and Fishbein (2010). Participants were asked to respond to the following statements: (1) It is easy for me to read these food safety labels before purchasing food; (2) I feel confident in my capability to examine these food safety labels before purchasing food. The responses to these items were rated on Likert scale (1= strongly disagree, 5= strongly agree) (Appendix C).

*People's knowledge* refers to their understanding of Chinese government policies that protect people from food-safety risks. It was measured in terms of the number of correct answers to the following statements (1) Food Safety labels are authorized by companies that make food; (2) The Chinese government inspects the food supply; (3) The Chinese government provides food safety resources for consumers; (4) The Product Quality Law and the Agricultural Production Safety Law are food safety laws in China; (5) The local government is able to regulate the safety of the food supply. The responses to each item

were coded as either true or false and the number of correct answers was calculated.

*Mass media dependence* refers to the degree to which people will pay attention and how much people depend on media. Participants were asked to respond to the following statements that were adapted from Kontos, Emmons, Puleo and Viswanath (2011): (1) Media plays an important role when I am obtaining food safety information; (2) I usually pay attention to food safety news from the media; (3) When food safety is concerned, I seek further information from the media. The responses to these items were rated on Likert scale (1= strongly disagree, 5= strongly agree) (Appendix C).

*Behavioral intent* was measured by the degree to which people would like to read food-safety labels. Stem words of the statements were borrowed and modified from Spence et al. (2013). Participants were asked to respond to the following statements: (1) I am willing to pay attention to these food safety labels before purchasing food; (2) I will read these food safety labels in the future; and (3) I am willing to buy foods with these food safety labels. The responses to these items were rated on Likert scale (1= strongly disagree, 5= strongly agree) (Appendix C).

**Table 2.** Demographic table of gender and region. (N=119)

Characteristics	Number	Percent (%)
Gender		
Male	63	53.0
Female	56	47.0
Region		
North	59	49.6
South	56	47.1
Hong Kong	1	0.8
Other areas	3	2.5

*Note.* Responses of gender were coded as 1= male, 2= female and responses of region were coded as 1= North, 2= South, 3= Hong Kong, 4= Other areas.

### Data Analysis

Data were analyzed by the statistical software SPSS (version 22.0). The results of demographics were shown in Table 2. Participants were mostly males (n=63, 53.0%) from northern China (n=56, 49.6%) between the ages of 18 and 27 years. The means and standard deviations of four key elements of PMT (severity, vulnerability, self-efficacy and response efficacy) were calculated, as well as controlling variables (knowledge and mass media dependence) and behavioral intention. Bivariate correlations and linear regression were used to analyze the hypotheses and research question in this study. Cronbach's Alpha

**Table 3.** Cronbach's Alpha Reliability for severity, vulnerability, response efficacy, self-efficacy, mass media dependence, and behavioral intent.

Variables	Cronbach's Alpha
Severity	.813
Vulnerability	.883
Response efficacy	.885
Behavioral intention	.918
Mass media dependence	.752
Behavioral intention	.906

coefficients were calculated to test for reliability among multiple items of each variable as shown in Table 3. Cronbach's alpha reliability was .813 for three items of severity and .883 for three items of vulnerability; Cronbach's alpha reliability for three items of response efficacy was .885, and Cronbach's alpha reliability for two items of self-was .918. Cronbach's alpha reliability for three items of behavioral intention was .906. Cronbach's alpha reliability for three items of media dependence was .752. The set of all Cronbach's alpha coefficients ranged from .752 to .918 and exceeded the acceptable cutpoint

(.700) (George and Mallery, 2003; Kline, 2000; Freberg, 2012). All multiple items were averaged and used in further analysis.

## CHAPTER IV

## FINDINGS

## Descriptive Data

Among four key factors of PMT, highest mean of the average of severity (M= 3.90) indicated that Chinese college students perceived food safety problems fairly serious in China (Table 4). In threat appraisal, Chinese college students perceived severity (M= 3.90) higher than vulnerability (M= 3.71). While in coping appraisal, the average for response efficacy (M= 3.13) was lower than that for self-efficacy (M= 3.23). Despite vulnerability being lower than severity, Chinese college students' evaluation of vulnerability still reached the score above average (M= 3.71). As a whole, coping appraisal ( $M_{\text{severity}} = 3.90$ ,  $M_{\text{vulnerability}} = 3.71$ ) was lower than threat appraisal ( $M_{\text{response efficacy}} = 3.13$ ,  $M_{\text{self-efficacy}} = 3.23$ ).

Overall, Chinese college students relied on mass media when they were obtaining information about food safety (M= 3.82). As another controlling variable, knowledge (M= 3.17) about Chinese government's policy for food safety was not very well known by Chinese college students as expected.

As the dependent variable, the average of behavioral intention was rated

**Table 4.** Descriptive Statistics of severity, vulnerability, response efficacy, self-efficacy, behavioral intention, knowledge, and mass media dependence. (N=119)

Variables	Mean	Standard Deviation
Severity	3.90	0.714
Vulnerability	3.71	0.806
Response efficacy	3.13	0.948
Self-efficacy	3.23	1.002
Behavioral intention	4.32	0.695
Knowledge	3.17	1.400
Mass media dependence	3.82	0.759

*Note.* Means are the average score of three items in each variable. Responses of mass media dependence, severity, vulnerability, self-efficacy and response efficacy were coded as 5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree. Responses of knowledge were coded by the number of correct answers.

with the mean of 4.32 suggesting that Chinese college students strongly intended to follow the recommendations to look at the food safety labels and buy foods with those food safety labels.

**Table 5.** Pearson correlation coefficients for threat appraisal, coping appraisal, knowledge, mass media dependence and behavioral intention. (N=119)

Variables	1	2	3	4	5	6	7
1. Knowledge	--						
2. Mass media dependence	.535**	--					
3. Severity	.178	.094	--				
4. Vulnerability	.172	.107	.882**	--			
5. Response efficacy	.206*	.129	.813**	.867**	--		
6. Self-efficacy	.142	.124	.747**	.757**	.814**	--	
7. Behavioral intention	.193*	.102	.886**	.856**	.868**	.796**	--

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

### Hypotheses Testing

A Pearson correlation test was conducted to test the Hypotheses. As Table 5 shows, there was a positive relationship between severity of food safety and consumers' willingness to read food safety labels and buy foods with food safety labels ( $r = .886$ ;  $p < .01$ ), as well as between vulnerability of food safety and consumers' behavioral intent to read food-safety labels and buy foods with food safety labels ( $r = .856$ ;  $p < .01$ ). Thus, hypothesis 1a and 1b were supported.



**Table 6.** Hierarchical regression analysis of Mass media dependence, knowledge, threat appraisal, coping appraisal and behavioral intention (N=119)

Block of Independent Variables	B	SE B	$\beta$	Total R Square
Controlling variables	4.024	.326		.037
Knowledge	.096	.054	0.194	
News media consumption	-.001	.099	-.001	
Independent Variables	1.461	.202		.839**
Threat Appraisal				
Severity	.356	.082	.365**	
Vulnerability	.107	.083	.124	
Coping Appraisal				
Response efficacy	.243	.064	.332**	
Self-efficacy	.109	.047	.158*	

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

In a similar way, the relationship between severity of food safety and consumers' willingness to read food-safety labels and buy foods with food safety labels was also positive ( $r = .868$ ;  $p < .01$ ), and so was the relationship between severity of food safety and consumers' behavioral intent to read food-safety labels and buy foods with food safety labels ( $r = .796$ ;  $p < .01$ ). Thus, both hypothesis 2a and 2b were supported.

### Research Question

A Hierarchical Regression test was conducted to answer the research question. As Table 4 shows, both knowledge and mass media dependence were not significant predictors with respect to behavioral intention. And by controlling knowledge and mass media dependence, severity ( $\beta = .365$ ,  $p < .01$ ), response efficacy ( $\beta = .332$ ,  $p < .01$ ), and self-efficacy ( $\beta = .158$ ,  $p < .05$ ) all turned out to be significant predictors of Chinese college students' willingness to read food-safety labels and buy foods with food safety labels. In terms of effect size, severity ( $\beta = .365$ ) demonstrated the largest impact on Chinese college students' willingness to read food-safety labels and buy foods with food safety labels followed by response efficacy ( $\beta = .332$ ) and self-efficacy ( $\beta = .158$ ). Yet vulnerability did not reach statistical significance ( $\beta = .124$ ,  $p = .198$ ).

## CHAPTER V

## DISCUSSION

## Significance of Study

This study applied the key variables of Protection Motivation Theory to explain Chinese consumers' behavioral intent to read food-safety labels and to purchase food with such labels. The findings confirmed the importance of the key variables in Protection Motivation Theory. The four hypotheses were supported; severity, vulnerability, self-efficacy and response efficacy were all proved be positively related to Chinese college students' behavioral intent to read food safety labels and buy foods with food safety labels. After controlling knowledge and mass media dependence, severity was considered the strongest indicator to Chinese college students' behavioral intent to read food safety labels and buy foods with food safety labels in this study, which means that the more severe Chinese college students considered Chinese food safety problems, the more likely that they would read food safety labels and buy foods with food safety labels.

The bivariate relationships among threat appraisal (severity and vulnerability), coping appraisal (response efficacy and self-efficacy), and

behavioral intent were quite robust. As Protection Motivation Theory predicts, people are more likely to read food-safety labels and to purchase food with safety labels when they perceive food safety to be a critical social issue and they feel susceptible to this type of risk. Also, people's behavioral intent increases when they think food safety labels can actually protect them from potential risk and they have the opportunity to read them before purchasing.

In terms of the relative predictive power of PMT variables on behavioral intent, severity, response efficacy, and self-efficacy, all except vulnerability demonstrated significant influence on consumer's willingness to read food-safety labels after experiencing controlled knowledge and mass media dependence. Interestingly, neither knowledge nor mass media dependence predicted behavioral intent, since the relationship between vulnerability and people's behavioral intent was positive (Std. Beta= .124;  $p = .198$ ) but not statistically significant when all factors were considered. A previous study found that, if people feel vulnerable to the danger and have ability to follow the suggestions, they are more likely to follow them "regardless whether or not they thought the response would be effective" (Maddux and Rogers, 1983, p. 477). An alternative explanation lies in the low response rate (7.20%), since the standard error will increase as the response rate decreases (Wimmer and Dominick, 2013).

Participants' intentions to follow the recommendations were fairly high, predictors in threat appraisal were rated high, and predictors in coping appraisal were rated relatively low. Maddux and Rogers (1983) discussed this in their study of Protection Motivation Theory and self-efficacy-- when highly exposed to danger, people are "more easily to be persuaded by any information that offered the possibility of avoidance" (p. 447). The data in this study somewhat mirrors this situation.

This study also contributed knowledge by examining people's behavioral intent with regard to food-safety labels. Such labels were introduced many years ago to protect Chinese consumers. Many studies (Yin et al., 2010; Liu et al., 2013; Qin et al., 2003; Jia et al., 2002) introduced such labels in their studies, yet few of them tested whether or not people were willing to read them and to buy the food labeled in this way. This study tried to fill this gap.

For those who doubt effectiveness of food-safety labels, the findings of this study demonstrated a positive implication, at least for Chinese students who participated in this study. They were willing to read food-safety labels as long as they regard food-safety issues in China seriously and feel confident about the labels' validity. If government officials and campaign strategists effectively encourage the key components (severity, vulnerability, response efficacy, and

self-efficacy) of Protection Motivation Theory, their campaigns are likely to be more successful.

### Limitations and Suggestions for Future Study

The present study has several limitations. First, all respondents were students at a large public university in the United States. This population was chosen for convenience and represented neither all Chinese consumers nor all Chinese students in the US.

Second, respondents in this study are Chinese students currently studying in the U.S. It may be problematical that all their responses were based on their past experience in China and we had no knowledge with respect to how many years they had lived in United States and whether their cultural adaptation to the US might influence their answers to the survey. Therefore, future study with participants actually living in China would probably lead to a more valid generalization of Chinese consumer behavior.

Third, the low response rate may also have influenced the results. A total of 1,790 email requests were sent to Chinese students, and the survey was available for two weeks. Though a reminder was sent to all participants after one week, only 126 students participated in this study, representing a response rate

of only 7.20%. The small size of this sample can obviously affect accuracy of the results.

Fourth, there could have been a problem because people may sometimes have randomly guessed at one of the answer options in the knowledge test even though they really did not know the correct answer. Adding an “ I don’t know” option might have measured knowledge more accurately.

Besides, price could be considered as a controlling variable. Even though people highly rate threat and coping-appraisal measures, price can also directly affect behavioral intent.

Finally, education status should also be considered as a controlling variable. The study recruited 1790 Chinese students including both undergraduate and graduate. Future study may test the relationship between education status and behavioral intention to fill this gap.

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## APPENDIX A

## INVITATION LETTER

Dear ISU Chinese Student,

You are invited to participate in a research survey about food safety in China.

The survey should only take approximately 5-8 minutes. The data collected by this survey will help us to understand people's perception about food safety risk in a thesis research paper.

If you agree to participate, you will be asked to complete a short survey. All the information you provide will be anonymous, confidential and for academic use only. And your participation is completely voluntary and you have any right to terminate the participation at anytime.

If you have any questions, please contact me at [miao1988@iastate.edu](mailto:miao1988@iastate.edu) or call 614-500-2854.

By clicking the survey link below, you agree to participate in this research study:

[https://iastate.qualtrics.com/SE/?SID=SV\\_0GIEiQuGw1bsGIR](https://iastate.qualtrics.com/SE/?SID=SV_0GIEiQuGw1bsGIR)

Your participation is appreciated.

Best regard,

Weiwei Miao

Graduate Research Assistant

101 Hamilton Hall

Greenlee School of Journalism and Mass Communication

Iowa State University

Ames, IA, 50010

Tel: 614-500-2854

Email: [miao1988@iastate.edu](mailto:miao1988@iastate.edu)

## APPENDIX B

### INFORMED CONSENT DOCUMENT

#### **Introduction**

This is a research study. The purpose of this study is to understand people's perception about food safety risk in China. You are invited to participate in this study because you are on the ISU Chinese student list. You should not participate if you are under 18 or not a Chinese student.

#### **Description of Procedures**

If you agree to participate, you will be asked to take a five-part survey concerning your perception about food safety in China and intention to read food safety labels. Your participation will last for 5-8 minutes and you may need to see four food safety labels during the survey.

#### **Risks or Discomforts**

There are no foreseeable risks from participating in this study.

#### **Benefits**

If you decide to participate in this study, there may be no direct benefit to you. It is hoped that the information gained in this study will benefit society by proving a



basis for researchers and Public Service Announcements advertisers who devote themselves to helping people at food safety risk in China.

### **Costs and Compensation**

You will not have any costs from participating in this survey and you will not be compensated for participating in this survey.

### **Participant Rights**

All the information you provide will be totally anonymous. Participating in this study is completely voluntary. You may choose not to take part in the study or to withdraw from the study at any time, for any reason, without penalty or negative consequences. You can skip any questions that you do not wish to answer.

### **Confidentiality**

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available.

### **Questions**

For further information about the study, please contact Weiwei Miao, miao1988@iastate.edu, (614)500-2854, 101 Hamilton, Ames, IA 50011-1180. Or

Suman Lee, smlee@iastate.edu, (515)294-0496, 201 Hamilton, Ames, IA 50011-1180. If you have any questions *about the rights of research subjects or research-related injury*, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

To proceed the survey, please use the following button:

- Click "**next**" to continue,
- Click "**previous**" to return to the previous page,
- Click "**exit**" to exit the survey,
- Click "**Submit**" to submit your survey.

## APPENDIX C

## STUDY QUESTIONNAIRE

**Information About You**

Are you a Chinese?

Yes\_\_\_ No\_\_\_

Region where you lived in China:

North of China (Mainland)\_\_\_

South of China (Mainland)\_\_\_

Hong Kong \_\_\_

Other. Please specify\_\_\_.

Gender:

Male\_\_\_ Female\_\_

Age: \_\_\_\_.

## Food Safety in China

Questions	Scale	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(1) Food safety incidents happen frequently in China.	1	2	3	4	5	
(2) Unsafe food is widely spread in Chinese food system.	1	2	3	4	5	
(3) People's health is at risk due to the current Chinese food safety.	1	2	3	4	5	
(4) My health can easily be at risk because of unhealthy food.	1	2	3	4	5	
(5) It is quite possible that I will ever get unsafe food.	1	2	3	4	5	
(6) My health risk is highly related to food safety very due to the current Chinese food safety system.	1	2	3	4	5	

**Check the following questions based on your knowledge.**

<b>Questions</b>	<b>Scale</b>	<b>TRUE</b>	<b>FALSE</b>
(7) Food Safety labels are authorized by companies that make food.		<b>1</b>	<b>2</b>
(8) The Chinese government inspects the food supply.		<b>1</b>	<b>2</b>
(9) The Chinese government provides food safety resources for consumers.		<b>1</b>	<b>2</b>
(10) The Product Quality Law and the Agricultural Production Safety Law are food safety laws in China.		<b>1</b>	<b>2</b>
(11) The local government is able to regulate the safety of the food supply.		<b>1</b>	<b>2</b>

### Mass Media Dependence

Questions	Scale	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(12) Media plays an important role when I am obtaining food safety information.		1	2	3	4	5
(13) I usually pay attention to food safety news from the media.		1	2	3	4	5
(14) When food safety is concerned, I seek further information from the media.		1	2	3	4	5

You are about to see several food safety labels that are launched by Chinese government. After the showing of the labels, there are some following questions.



绿色食品  
Greenfood

Questions	Scale	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(15) Reading these food safety labels helps prevent choosing unsafe food.		1	2	3	4	5
(16) These food safety labels provide me with useful information on purchasing safe food.		1	2	3	4	5
(17) Reading these food safety labels relieves my concern about food safety.		1	2	3	4	5

Questions	Scale	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(18) It is easy for me to read these food safety labels before purchasing food.		1	2	3	4	5
(19) I feel confident in my capability to examine these food safety labels before purchasing food.		1	2	3	4	5



Questions	Scale	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(20) I am willing to pay attention to these food safety labels before purchasing food.		1	2	3	4	5
(21) I will read these food safety labels in the future.		1	2	3	4	5
(22) I am willing to buy foods with food safety labels.		1	2	3	4	5