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A Comparative Study of American and Chinese College Students' Social Trust, Conspiracy Beliefs, and Attitudes Toward Genetically Modified Crops

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ABSTRACT

This study compares American and Chinese college students' willingness to purchase GM crops and examines the factors that have a bearing on this behavioral intention. It examines how social trust and conspiracy beliefs influence risk and benefit perceptions using data gathered through an online survey. The findings indicate that trust in experts and strength of conspiracy beliefs are both significant predictors of perceived risks and benefits, and subsequent intentions to consume GM foods. . The results also show that the Chinese reported more ambivalent attitudes toward GM crops, perceiving higher benefits and higher risks, and consequently, had lower willingness to purchase GM foods. The Chinese respondents also registered weaker levels of social trust and stronger conspiracy beliefs.

CHAPTER 1

INTRODUCTION AND STATEMENT OF THE PROBLEM

Although it has been only 20 years since genetically modified (GM) crops have entered the market, they have been planted to an expanding area worldwide (Nelson, 2001). Their introduction has been greeted with contentious debates that rage to this day. Advocates argue that GM crops can help feed a growing world population, enhance the nutrient content of food items, and improve the quality of the environment due to the reduced use of pesticides, herbicides, and chemical fertilizers. Those against GMOs, on the other hand, stress that they pose yet unknown risks to human health, lead to gene pollution and thus harm biodiversity (Ando & Khanna, 2000). Some even contend that transgenic products do not offer economic and political justice (Wang, 2004), and are unethical because the technology tampers with nature (Nelson, 2001). Furthermore, some claim that contrary to what advocates have suggested, GMOs have so far failed to bring the real benefits to farmers they promised (Sewell, 2012).

Given these competing arguments, researchers, particularly those from North America and Western Europe, have rushed to study the public's attitudes and sentiments toward GMOs (e.g., Grunert et al., 2003; House et al., 2001; Costa-Font & Gil, 2009; Hallman et al., 2002). However, these studies have primarily focused on consumers in

developed economies and have accorded less attention to those in the developing world. This represents a major gap in scholarly attention considering that GM crops are being planted in more and more areas in countries like Argentina, Brazil, Paraguay, South Africa, India, and China.

According to the International Service for the Acquisition of Agri-biotech Applications (ISAAA), GM crops were grown in 134 million hectares worldwide in 2009, 44% of which were in developing countries. The growth rate in acreage is thus much higher in developing countries (13%) than in the developed ones (2%) (GMO Compass, 2010). Of the 16.7 million farmers who grew GM crops that year, 15 million were from the developing world (James, 2011).

Despite this trend, studies of public perception among consumers in less industrialized countries have been few and far between. To help bridge the gap, this study compares the attitudes toward GMOs between American and Chinese consumers, two countries that have had tremendous (in the case of the US) and some (in the case of China) success in GM applications. The United States is, and still remains, the most important GM crop producer in the world, growing GM crops in 43.1% of its total acreage in 2010 (James, 2011). American farmers grow GM corn, soybeans, cotton, canola, sugar beets, alfalfa, papaya, and pumpkin. Although China ranks only sixth in terms of area devoted to GM

crops (3.9 million hectares compared to America's 69 million in 2010), seven million Chinese farmers grow GM cotton, papaya, poplar, potato, and sweet pepper (James, 2011). In 2009, China allowed the growing of two kinds of GM rice, which made it the first country to permit the commercialization of GM staple foods.

Despite this rate of adoption, few studies have examined the Chinese people's attitude toward GMOs. Among the few is a descriptive study that solicited the opinions of 2,006 respondents in Zhejiang province, a relatively developed region, which found that people generally had an optimistic but cautious view of biotechnology (Lyu, 2006). Lyu (2006) reports that 67% of her respondents thought GM food would bring benefits to a lot of people; approximately 50% found the risks associated with GM food unacceptable; 67% believed that GM food endangers future generations; and that such risks are somehow significant relative to the risks people face on a daily basis. In another study, Chen and Li (2006) made use of structural equation modeling to probe 564 Taiwanese consumers' attitudes using scales that had been originally developed to study the cognitions of consumers in other countries (Bredahl, 2001).

A comparative look at the American and Chinese perspective is in order particularly because observers say that those in less developed countries are more prone to subscribe to conspiracy beliefs. According to Roukis (2006), this may be due partly to

uncertainties that go in tandem with technological advancements, which characterize rapid globalization. Such uncertainties, Roukis (2006) posits, make for a climate that is conducive to conspiracy thinking. Conspiracy believers see globalization as mostly driven by powerful transnational companies that use their influence to full advantage. More often than not, they surmise, it is used to generate more profit to the detriment of local welfare. For example, Monsanto, DuPont, and other agricultural biotech giants have long been accused of invading the international seed market so that farmers all over the world become dependent on them for farm inputs. By doing so, they threaten the food security of nations. In blogs and other websites, GM supporters are branded "lackeys of Monsanto" who are subjecting unsuspecting people to "Frankenfoods." GM foods are described as "biological weapons that will lead to genocide." Such beliefs are likely to color people's opinions about GMOs and adversely impact the future applications of biotechnology for specific purposes.

The present research is a comparative study of American and Chinese college students, examining whether there are differences in their attitudes toward and opinions about GM foods. Specifically, it tests the hypothesis that people's trust in social institutions and the extent to which they subscribe to conspiracy beliefs will influence their attitude. The impact of trust on attitudes and attitude formation has been verified in previous studies

(e.g., Chen & Li, 2006; Costa-Font & Gil, 2009; Titchener & Sapp, 2002), but the influence of conspiracy beliefs on attitudes toward GMOs has not previously been examined.

This study also attempts to answer the following questions: Do people in these two countries differ in the level of trust they assign to three social institutions (the government, the scientific community, and the media) that serve as the primary sources of information about genetic engineering and GM crops? Does this level of trust matter in people's acceptance of conspiracy theories? To what extent is risk perception impacted by social trust? How do perceived risks and benefits affect consumer's intentions to behave? What personality traits (e.g., cynicism and sense of control) have a bearing on the attitudes people hold about GM foods? This study offers a comprehensive examination of the factors that account for people's attitudes toward GM foods.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Attitudes Toward Genetic Engineering and GM Crops

Some qualitative studies suggest that instead of simply being "for" or "against," people have more nuanced and sophisticated views about the GM issue (e.g., Poortinga & Pidgeon, 2006; Grove-White et al., 1997; Marris et al., 2001). For example, Marris et al. (2001) report that in their focus group studies, European participants demonstrated highly ambivalent, but also highly elaborated, arguments for or against GMOs.

Portinga and Pidgeon (2006) lament that most survey and interview questionnaires ask respondents for their degree of support or rejection of GM products, thus failing to detect the complexities of people's judgments and deliberations about the GM issue. To remedy this methodological weakness, they proposed a more comprehensive conceptualization, examining attitudes toward GMOs as being composed of three dimensions: (1) general evaluation, (2) involvement, and (3) certainty. They also analyzed two factors—perceived benefit and perceived risk—as determinants of people's attitudes, hypothesizing that those who perceive high benefit and low risk will hold a positive attitude toward GM foods. On the other hand, when people perceive high risk and low benefit, they will hold a negative attitude. Those who see both high benefit and high risk

are seen as more likely to form an ambivalent attitude. Conversely, individuals who perceive low benefits and low risk are likely to regard GM as an unimportant issue, which may result in an indifferent view. This typology of potential effects is shown Figure 1.

Moon and Balasubramanian (2004), following Poortinga and Pidgeon's (2006) method, found that risk perception and benefit perception explained 66% of the variance in attitude toward GMOs. When trust, awareness, and other demographic variables were added to the model, the R^2 increased only by 3%, which suggests that perceived risk and benefit almost completely mediate the effects of trust, psychological status, and personal characteristics on attitudes toward GMOs. Poortinga and Pidgeon's model illustrated the array of variables found to influence attitudes, indicating the difficulty of deriving a simple way with which to determine how much people like or dislike something. The classic view is that attitudes require consistency in cognitive, affective, and behavioral associations, which may be, at times, implausible (Fazio & Olsen, 2003). To simplify the process, the intention to behave was used in this study as implicit measurements of attitude toward GM foods.

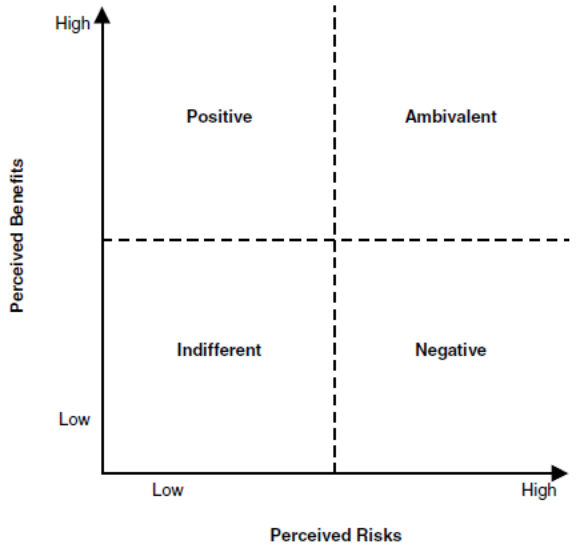

Fig.1. Typology of resulting attitudes based on perceived risks and perceived benefits (Poortinga and Pidgeon, 2006)

Two Approaches to Understanding Risk Perception

Previous studies suggest that people evaluate risks related to scientific and technological innovations using one of two approaches. The first, the cognitive science approach, emphasizes knowledge acquisition. It posits that once knowledge is transmitted, it will lead to the acceptance of technology (Bradbury, 1989; Lupton, 1999). The second, the sociocultural approach, considers risk as a product of social processes, emphasizing that public opinion is strongly influenced by trust in the institutions seen as responsible for scientific and/or technological developments, value orientation, and the perceived social acceptability of the innovation (Bradbury, 1989; Earle, 2010). Titchener and Sapp (2002) applied the two approaches to characterize consumers' opinions about biotechnology and

found significant effects for both (Titchener & Sapp, 2002). This finding supports Beck's (1999) assertion that risk assessment should be understood in terms of the individual's interpretations of information about the innovation, its perceived social acceptability, and the extent to which experts and regulatory bodies are trusted.

Many studies have failed to find empirical support for the exclusively cognitive approach (e.g., Chen & Li, 2006; Šorgo & Ambrožič-Dolinšek, 2009; Bredahl, 2001), finding that risk and benefit perceptions are not necessarily equivalent. That is, health risk tended to be seen more as "impending" while potential economic and environmental benefits appear more "distant." Furthermore, the test used to gauge knowledge levels about risky issues in previous research was found to be unsatisfactory (Šorgo & Ambrožič-Dolinšek, 2009). Because of these, the present study adopts the sociocultural approach to examine the factors that may influence attitudes and attitude formation.

Social Trust

Many scholars have provided empirical evidence that trust in institutions known to have purview over science and technology in society plays an important role in attitude formation (e.g., Poortinga & Pidgeon, 2006; Costa-Font & Gil, 2009; Earle, 2010; Chen & Li, 2006). A cross-national study conducted in Mediterranean Europe reports a strong positive correlation between trust in experts and regulatory bodies and perceived benefits

of GM foods (r =0.47 to 0.5). They also note a moderate negative correlation between trust and perceived risks (r= -0.1 to -0.33) (Costa-Font & Gil, 2009). A similar study conducted in Taiwan noted the same pattern, indicating that trust strongly correlates with benefits perception (r=0.53), and finding a negative, albeit non-significant, correlation between trust and risk perception (r=-0.02) (Chen & Li, 2006).

Siegrist and Cvetkovich (2000) posit that the lay public mainly relies on social trust when making judgments about the risks and benefits of a novel technology when personal knowledge is limited. This indicates that trust reduces the cost and complexity involved in making a rational judgment based on knowledge. The authors also note that when faced with a complex issue like genetic engineering, the lay public is more likely to search for information from news reports and rely more on expert opinion and commentaries or government announcements compared to other sources. However, people's level of knowledge about genetic engineering remains low, even among American consumers who have had some history and familiarity with GM and who are accustomed to food items with known GM ingredients (Hallman et al., 2002). Another study using a Chinese sample reported even lower knowledge levels—only 1% of Li et al.'s (2002) 599 participants said they know a lot about biotechnology while 54% said they know nothing about it; nearly 40% reported having no idea of the risks associated with GM foods. Given this limited

knowledge, people tend to rely on individuals and institutions they trust to reduce the complexity of risk management decisions. Such a finding suggests the utility of the sociocultural approach (Siegrist, 2000; Earle, Siegrist, & Gutscher, 2012).

Slovic (1993) pinpoints trust as the most important factor that influences attitudes, arguing that conflicts and controversies surrounding risk management are side effects of a functioning participatory democracy, but are amplified—or made highly contentious—by practices that systematically destroy trust. He argues that to solve conflicts, rebuilding trust is more fundamental than communicating information about innovations, particularly when issues are seen as highly personal or morally significant (Earle, Siegrist & Gutscher, 2012).

Generally, the term "social trust" refers to trust ascribed to people outside the circle of family and close friends (Naef & Schupp, 2009). This study focuses on trust in three sources of information about GM: (1) government, (2) scientific and technical experts, and (3) the media. These institutions were chosen because they are major actors in the GM issue. Government entities permit the entry of GMOs into national borders, regulate their use, and release pertinent information about genetic engineering in particular and biotechnology in general. Scientific experts develop GMOs, rigorously test them, explain abstract and complex principles related to transgenic research to the public, and cooperate with other agencies and instrumentalities about their potential applications. The media not

only convey information to government, science experts, and the public, but also report on the issue to a variety of stakeholders.

Conspiracy Thinking and Conspiracy Beliefs

A conspiracy belief is a lay theory that attributes the ultimate cause of an event or the concealment of an event from the public's view to a secret, unlawful, and malevolent plot by multiple actors seen as working together (Zonis & Joseph, 1994). Compared to common risk concerns, conspiracy beliefs have two features: (1) they interpret unintended or well-intended behavior (or consequences) as malicious, and (2) they emphasize that certain parties (political or otherwise) benefit considerably from such conspiracies.

Most studies on this topic deal with conspiracy thinking about political issues (e.g., Swami, Chamorro-Premuzic & Furnham, 2010; Grzesiak-Feldman & Irzycka, 2009; Goertzel, 2011). Concerning GMOs, conspiracy theories include the notion that they are weapons Americans are wielding to conquer the world and to make developing countries more dependent on the United States for agricultural inputs (Robin, 2010; Ermakova, 2005). While some consider GMOs as one of the solutions to the constant threat of poverty and hunger worldwide (Marris et al., 2001), conspiracy beliefs may distort perceptions of such an advantage. A recent example is the conspiracy thinking being promoted against golden rice, a variety with enhanced vitamin A content developed by European scientists to

offset vitamin A deficiency, especially among children in the developing world (Shan & Jin, 2012).

In a pilot survey, the present study found a very strong positive correlation between subscribing to conspiracy beliefs and risk perception (r=0.67). About GM foods, conspiracy beliefs abound. Those who are opposed to GM technology contend, for example, that profit-driven giant multinational corporations that produce GM seeds are out to destroy organic or ecological agriculture in a move to monopolize farming around the world. This idea is juxtaposed with the notion that GM crops carry genes from organisms of different species that are likely to have adverse effects on human health. Those who regularly consume GMOs, according to this theory, will soon suffer from stunted physical growth or will eventually develop reproductive dysfunctions.

A noteworthy characteristic of conspiracy beliefs is the use of academic and/or scientific sources to imbue them with some validity. Regarding the hypothesized negative health impacts of GM foods, two studies are widely cited. The first is an experiment conducted by Irina Ermakova, a neuroscientist at the Institute of Higher Nervous Activity and Neurophysiology of the Russian Academy of Sciences, who reported that young mice fed with GM corn exhibited stunted growth and reproductive abilities, and registered a death rate six times higher than those in the control group (Ermakova, 2005). The second is

a French study that also reported a higher incidence of death among mice fed with GM soybeans (Séralini et al., 2012). Although these findings have been questioned on methodological grounds (e.g., too small sample size, abnormal patterns also showing up in the control group, the mice species used was inherently deficient) (Marshall, 2007), they are used to lend conspiracy beliefs an aura of scientific credibility. After all, these two studies' weaknesses can be detected only by researchers who may find it difficult to communicate to and convince the lay public that such results are tenuous at best. These instances of misinformation may have enduring effects, continuously providing fertile grounds for conspiracy beliefs to persist unchecked.

Low levels of social trust also can cause conspiracy beliefs to thrive. Researchers have shown that conspiracy beliefs correlate with anomia and low levels of interpersonal and social trust (Swami et al., 2010; Crocker et al., 1999). Shepherd and Kay (2012) conducted a series of studies that established a model showing how insufficient knowledge leads to system justification. They contend that lack of knowledge about GMOs is likely to (1) foster feelings of dependence on government, which (2) increases system justification and government trust, which then leads to (3) an increased desire to avoid learning more about the issue when the information is discrepant with what is already known. Shepherd and Kay (2012) illustrate that uncertainty brings psychological discomfort, leading

individuals to directly look for an authorized information source—usually government officials or experts—rather than search for more information on their own accord. However, this situation also can lead to distrust in government or experts. The key point of their model is that people will look for reliable information sources when facing uncertainty, and these sources may include expert opinions or rumors. Once a rumor is accepted, people justify such acceptance by convincing themselves that government and society generally cannot be trusted. This may be the prevailing situation in China where young people are highly skeptical of government and experts, often thinking that these agents do nothing but spread propaganda.

Cynicism, Sense of Control and Conspiracy Beliefs

Some scholars have shown that individual personality traits can explain 50% of the variance in subscribing to conspiracy beliefs. In other words, some people are more prone to conspiracy thinking (e.g., Swami, Chamorro-Premuzic & Furnham, 2010). Of these, those who are more cynical about many aspects of life tend to cling to conspiracy theories. Social psychologists view cynicism as an attitude that is characterized by frustration and negatively valenced beliefs, resulting primarily from unmet expectations and/or other facets of the external environment (Brockway, Carlson & Jones, 2002). In other words, cynicism may be the outcome of perceived gaps between notions of ideal democratic

principles and political reality, between career prospects and a cruel job market, among other dichotomies. Swami et al. (2010) observe that those who were cynical with the state of political affairs were less willing to trust authorities and were more likely to hold conspiracy beliefs about the September 11 terrorist attacks on the United States.

Another personality trait related to conspiracy beliefs is sense of control over life events, which has been defined as a feeling of autonomy, of choosing how one lives his/her life, of doing work in one's own way (Rubin, 2007). Whitson and Galinsky (2008) found that participants who lack this sense of control were more likely to hold illusory belief patterns, suggesting that the lack of control provokes people to seek patterns that provide compensatory mechanisms to restore feelings of control. Adherence to conspiracy beliefs is an example of such a pattern. As Knight (2002) suggests, "conspiracy theory is the poor person's cognitive mapping in the post-modern age" (p. 8).

Model Specification

Considering the foregoing literature review, the study examines the path of influence or conceptual framework shown in Figure 2.

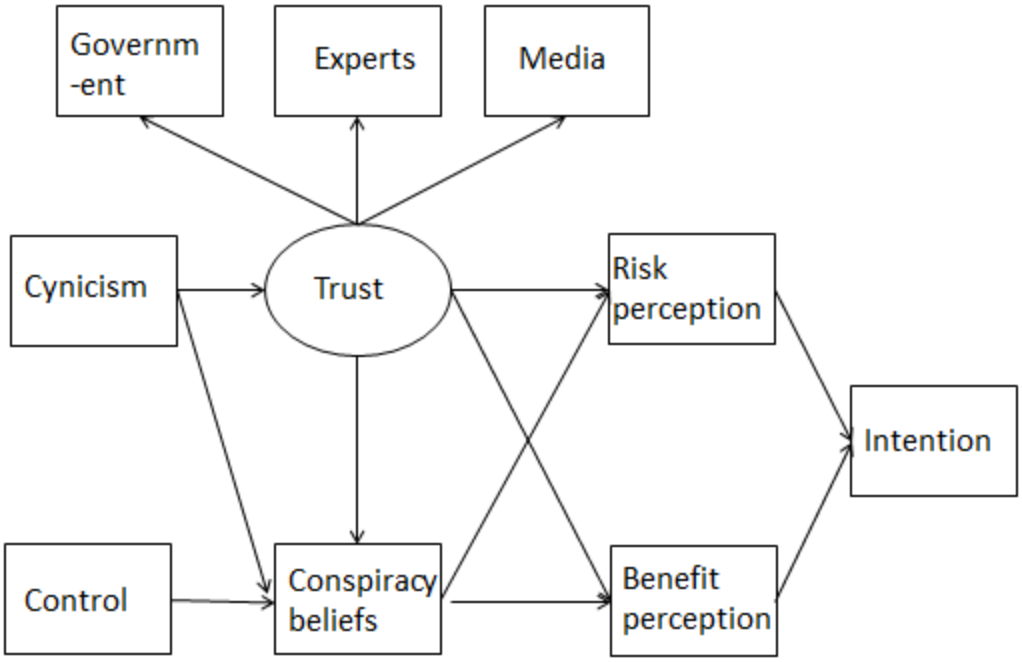

Figure 2. The study's conceptual model

In this model, willingness to purchase GM foods, a behavioral intention, is used to indicate people's attitude toward GM foods. Willingness to purchase GM foods is seen as being influenced by people's perception of benefits and risks. These two variables are hypothesized to be affected by levels of social trust as well as the degree to which people believe in conspiracy theories. Social trust is a latent variable measured by the extent to which individuals trust experts, the government, and the media. Cynicism is predicted to lead to subscribing more to conspiracy beliefs and lowering the level of trust people hold in social institutions. Another personality trait, sense of control, is expected to have a bearing on conspiracy beliefs. Specifically, the following hypotheses are posed:

H1: Higher levels of cynicism will lead to stronger conspiracy beliefs.

H2: Higher levels of cynicism will lead to lower levels of social trust (in government, experts, and the media).

H3: Higher levels of control will depress conspiracy beliefs.

H4: Lower levels of social trust will lead to stronger conspiracy beliefs.

H5: Higher levels of social trust will lead to higher levels of perceived benefits of GMOs.

H6: Higher levels of social trust will lead to lower levels of perceived risks related to GMOs.

H7: Stronger conspiracy beliefs will lead to lower levels of perceived benefits of GMOs.

H8: Stronger conspiracy beliefs will lead to higher levels of perceived risks related to GMOs.

H9: Higher levels of perceived risks lead to lesser willingness to purchase GM products.

H10: Higher levels of perceived benefits lead to greater willingness to purchase GM products.

The model diagrammed above will be tested on an American and a Chinese sample. Based on cultural and political differences between China and the U.S., this study also poses the following hypotheses:

H11: The Chinese sample will show stronger conspiracy beliefs and lower levels of social trust.

H12: The effect of strength of conspiracy beliefs on risk perception and benefits perception will be stronger among Chinese respondents.

H13: The Chinese sample will perceive more risk and less benefit related to GMOs compared to the American sample.

H14: In general, the Chinese sample will hold less positive intentions toward GMOs than the American sample.

CHAPTER 3

METHOD

Pilot test

Six weeks before the main survey, a pilot survey was conducted to examine the reliability of each scale. Sixty-one students recruited from a sociology course returned valid responses. After analyzing the results, I reworded or dropped scale items with low factor loadings. The results of main survey indicated that these changes improved the reliability and validity of my survey tools.

Participants

To gather data for this study, an online survey of Chinese and American consumers was conducted. The respondents from the two countries were all college students. Similar life experiences among college students allowed some measure of control. The American students were recruited from Sociology courses in a large university in the Midwest. A total of 398 students were introduced to the study in their classes and were asked to participate by completing an online questionnaire. Of the 398 students, 306 returned valid questionnaires. The Chinese participants were recruited from two universities located in Beijing and Shanghai. Their email addresses were solicited from professors and former students. However, the Chinese email server closed down the link to the survey site that

carried the study questionnaire. Thus, the invitation to participate and the questionnaire were sent individually via email. A total of 342 valid responses were received from China.

Information about informed consent and the survey questionnaire were posted online. For the American sample, the survey link was sent directly to the respondent's email address. A week after the initial invitation, a reminder email was sent to those who had not returned their completed questionnaire. Extra course credits were offered to encourage participation. To the Chinese sample, the invitations were sent manually because the email server blocked invitations sent using the survey software.

Variables and their Measurement

The questionnaire was divided into two parts. The first part solicited demographic information and the extent to which respondents consider themselves informed about GMOs and GM products. This section was made up of multiple-choice questions. The second part measured respondents' risks and benefits perception, strength of adherence to conspiracy beliefs, levels of social trust, and personality traits (sense of control and cynicism) using a series of Likert scales. The complete questionnaire is shown in Appendix B.

Benefit perception in this study refers to expectations of positive outcomes associated with GM crops/foods. Seven scenarios were used to measure perceived benefits.

Respondents were asked to indicate the degree to which they think seven scenarios are likely to occur on a scale of 1 to 7, in which 1 means "will never occur" and 7 means "will surely occur." These scenarios were as follows: (1) GM crops will reduce farmers' production costs; (2) GM crops will reduce the price of food items for consumers; (3) GM crops will cut down pesticide use; (4) GM crops will cut down fertilizer use; (5) GM crops will increase yields; (6) GM crops will feed the growing population in the developing world; and (7) GM crops can increase the efficiency with which farmers use their land. Answers to these items were averaged to form an index of benefits perception. Higher scores indicated higher perceptions of benefits that can be derived from GM foods. This scale reported satisfactory reliability (Cronbach α=0.812 in the American sample and α=0.834 in the Chinese sample).

Risk perception refers to the subjective judgment that people make about the characteristics and severity of risks related with GM crops/foods. This variable was measured by using scale items employed in previous research (Costa-Font & Gil, 2009; Moon & Balasurbramanian, 2004; Erdogan et al., 2009) although these items were re-worded. Respondents were asked to rate how likely they thought a scenario would occur using a scale of 1 ("will never occur") to 7 ("will surely occur"). Five scenarios were used to measure perceived risks: (1) GM crops carry genes from different species that will cause

potential harm to the human body; (2) When pollen from GM plants cross-pollinate with those of other crops, weird hybrids will result; (3) The widespread use of GM crops will reduce biodiversity; (4) Genetic engineering will result in immoral consequences; and (5) Multinational corporations are increasingly controlling farming. Higher scores mean higher risk perception. The answers to these five items were averaged to form an index of risk perception. This scale reported satisfactory reliability in the American sample (α=0.795) and acceptable reliability in Chinese sample (α=0.707).

Conspiracy beliefs. The items that comprise this scale were culled from books that discussed the controversies and arguments surrounding genetic engineering (e.g., Jeffrey Smith's *Seeds of Deception*, 2003, and *Roulette: The Documented Health Risks of Genetically Engineered Foods*, 2007) and online discussions on blogs, microblogs, discussion boards, and social networking sites. Respondents were asked to indicate the extent to which they agree with the following six items: (1) GMOs were originally invented as a weapon for biological warfare; (2) People who regularly consume GMOs will suffer from stunted physical growth or reproductive harm; (3) Test results on the effect of GMOs on health are being kept secret; (4) Giant multinational corporations that produce GM seeds want to destroy organic or ecological agriculture to protect their benefits; (5) When some countries that export GM seeds want to take over global agriculture; and (6)

Those officials who promote GM crops work hand-in-hand with giant biotech companies. Here, the response options ranged from 1 to 7 where 1 means "strongly disagree" and 7 means "strongly agree." The answers were averaged to serve as the measure of strength of conspiracy beliefs. Higher scores on this index suggest stronger adherence to conspiracy beliefs. This scale also reported satisfactory reliability (α=0.859 in the American sample and α=0.793 in the Chinese sample).

Trust in government refers to the extent to which respondents believe that government can protect their health and other interests related to GM issues. Trust in government was measured by asking students the degree to which they agree with the following six statements that were adapted from Poortinga & Pidgeon (2006): (1) The government cares about what average people think about GM crops; (2) The government is acting in the public interest with regard to GM crops; (3) The government has done a good job in the past with regard to GM crops; (4) The government is competent enough to deal with GM crops; (5) In general, official government reports about GM crops are credible; and (6) The government gives high priority to people's well-being. The response options ranged from 1 to 7 where 1 means "strongly disagree" and 7 means "strongly agree." The answers were averaged, and higher scores suggested higher levels of trust toward the

government on the GM crops issue. The reliability of this index was 0.907 and 0.886 for the American and the Chinese sample, respectively.

Trust in science and technology experts refers to the degree to which people are confident that experts have the capability and know-how to safeguard public interests through their knowledge and technical capabilities. This variable also was measured using seven-point Likert scales derived from Costa-Font & Gill (2009). Respondents were asked to rate their level of agreement with the following statements using a scale that ranged from 1 to 7 where 1 means "strongly disagree" and 7 means "strongly agree": (1) Scientists who work on genetic engineering can be trusted about GM issues; (2) The way scientists are conducting research on GMOs will have disastrous effects (reverse scored); (3) GM crops have undergone rigorous scientific testing and are therefore safe; (4) Although there may be some uncertainties related to GM products, scientists can deal with them accordingly; (5) Those so-called scientists who study GMOs care more about promoting themselves than the public's good (reverse scored); and (6) On the GM crops issue, scientists stand for the truth, rather than for the interest of certain groups.. The answers to these items were averaged. The reliability of this scale was α=0.792 for the American sample and α=0.746 for the Chinese sample.

Trust in media refers to perceptions of expertise and trustworthiness people hold about the traditional (i.e., television, radio, newspapers, magazines, books) and the online media. Kohring and Matthes (2007), testing a multidimensional scale to measure the public's trust in the media, found that general media trust could be categorized into four dimensions: (1) trust in the selectivity of topics, (2) trust in the selectivity of facts, (3) trust in the accuracy of depictions, and (4) trust in journalistic assessment. This study used five items from their scale that were re-worded to simplify statement structures. These were: (1) The media usually ignore important problems related to GM crops (reverse scored); (2) When reporting about GM crops, the media often take the comments and opinions of information sources out of context (reverse scored); (3) Media reports about GM crops are reliable; (4) Criticisms of GM crops in the media are expressed in an adequate manner; and (5) Reports about GM issues in the media are not biased in favor of any person or interest group. Again, respondents were asked to rate these five statements on a scale of 1 to 7 where 1 means "strongly disagree" and 7 means "strongly agree." The answers were averaged; higher scores suggested stronger trust in the media. This scale reported acceptable reliabilities of α=0.704 and α=0.741for the American and Chinese sample, respectively.

Cynicism is "an attitude or state of mind characterized by a general distrust of others' apparent motives or ambitions, or a general lack of faith or hope in the human race or in individuals with desires, hopes, opinions, or personal tastes that a cynic perceives as unrealistic or inappropriate, therefore deserving of ridicule or admonishment" (Piering, 2006). The items used to measure cynicism were derived from three sources: Citrin and Elkins's (1975) cynicism scale, Dalbert et al.'s (2001) unjust scale, and the China Family Panel Studies' (CFPS) value scale (ISSS, 2012). All the items of these scales were tested, and those which did not contribute to present study were filtered. These items aim to reflect whether there is a gap between expected and existing life circumstances. The original index had ten items; five were dropped after the pilot test. The remaining five items were as follows: (1) In today's society, corruption is inevitable if you want big achievements; (2) I basically believe the world is an unjust place; (3) All politicians are bad; some are just worse than others; (4) No one can hope to stay honest once he/she enters politics; and (5) If politicians stick to their ideas and principles, they are unlikely to reach the top of their profession. Respondents were asked to rate these five statements on a scale of 1 to 7 where 1 means "strongly disagree" and 7 means "strongly agree." The answers were averaged; higher scores suggest stronger cynicism. The reliability of this five-item index was 0.799 and 0.757 for the American and the Chinese sample, respectively.

Sense of control. According to Whitson & Galinsky (2008), people who feel they lack control over life events are more likely to perceive conspiracy. The items used to measure sense of control were adapted from Pearlin and Schooler (1978) and Ross (2011) who report reliabilities of 0.740 and 0.696, respectively. The six items that comprised the scale were as follows: (1) I can do just about anything I really set my mind to; (2) There is really no way I can solve some of the problems I have (reverse scored); (3) What happens to me in the future mostly depends on me; (4) I have little control over things that happen to me (reverse scored); (5) I often feel helpless in dealing with my problems (reverse scored); and (6) There is little I can do to change many of the important things in my life (reverse scored). The answers were averaged to serve as the measure of strength of sense of control. High scores on this index suggested a strong sense of control.

Intention to purchase. A single item was developed to measure people's willingness to purchase GM foods. Respondents were asked to select the statement that comes closest to their intentions, using the following response scale: (1) I will be very cautious. I won't choose any food that contains even a minor ingredient made from GM crops (e.g., seasonings); (2) I will be generally cautious. I won't choose any food with *main* ingredients derived from GM crops (e.g., the tomato pieces in a sandwich); (3) I will be somewhat cautious. I won't choose any with most or all ingredients derived from GM

crops (e.g., soybean oil or corn oil); and (4) I won't be cautious at all. I will choose any food that without regard to whether it contains GM ingredients.

Information sources. These items measure exposure to GM information and the sources of that information. Respondents were asked through what sources (i.e., official reports from the Department of Agriculture, news reports, social networking sites, taught in school, personal communication, academic literature, and other sources) they get information about GMOs, and how often they hear, read, watch, and generally learn about GM topics or issues.

Demographic variables. Respondents were asked for demographic information, including gender, household income before taxes in 2012, and whether their curriculum includes GM-related courses.

Quality control tests. Two quality tests were embedded in the questionnaire in order to check whether participants were reading the questions carefully and responding thoughtfully. At two points in the questionnaire, respondents were asked to select a certain answer. Those participants who failed to pass the first quality test were fully dropped from data analysis, and those failed to pass the second quality test were partially dropped. I used the response latency and the pattern of answers to judge whether to keep or drop responses preceding the second quality control test.

Confirmatory factor analysis

I conducted a set of confirmatory factor analyses (CFA) to check the structure of the scales. Results of CFA showed that in each scale, all items had high consistency. All but one of the scales extracted only a single factor, and most of items showed satisfactory factor loadings higher than 0.6. I also noticed that for every scale, the first item had the lowest factor loading, no matter whether the data had been collected in America or China, and even though the item had proved reliable with a high factor loading in the pilot test. Thus I have reason to believe that a small bias was introduced by the survey process, in that respondents at beginning of each set of items failed to catch the intention of the scale. The factor loadings of the first one or two items will always be underestimated unless researchers can randomize the order of items in their scales. From this point of view, results of CFA cannot be used as the decisive criteria to evaluate the quality of the scales. Full tables of CFA can be found in appendix A.

CHAPTER 4

RESULTS

The Sample

A total of 458 questionnaires were distributed in the United States out of which 398 were returned. Among these, 306 passed two quality control tests. Thus, the valid U.S. response rate was 66.8%. Approximately 3,500 questionnaires were distributed in China of which 587 were returned. However, only 342 passed the quality test, resulting in a valid response rate of 9.7%. Table 1 shows that the American sample had a very high initial response rate, and almost everyone who started the survey finished it, but that a large proportion of invalid responses were filtered by two quality tests. For the Chinese sample, the initial response rate was low, and many respondents dropped out after answering the first two or three questions, but those who finished survey provided high quality data. We have reason to believe that the incentives offered to the American sample may have caused this phenomenon.

Table 1. The response rates for two sample groups

	Questionnaires distributed	Surveys started		Surveys finished		Valid responses	
	n	n	%	n	%	n	%
American sample	458	400	87.3	398	86.9	306	66.8
Chinese sample	≈3500	587	16.8	376	10.7	342	9.8

Knowledge and Exposure to GM Information

As shown in Table 2, the Chinese respondents reported being considerably more informed about the GM issue, with 57.3% saying they have at least some knowledge about GM crops. Only 33% of the American sample indicated that they have at least some knowledge. Of the Chinese respondents, 37.1% had taken or plan to take courses related to genetic engineering and GM crops; only 7.5% of the Americans said so, suggesting the possible introduction of bias due to the sampling strategy. Furthermore, the results about information exposure confirm that the Chinese were indeed more informed about the issue. None of them said they had never heard about GMOs, but 11.8% of the Americans said so. Only 27.5% of those from the U.S. reported hearing about GMOs once or more a month, compared to 54.4% of the Chinese students. The Chinese respondents also reported an

average of 2.79 sources of information about the topic, while the Americans indicated only an average of 1.72.

Table 2. Gender, knowledge, and GM information in the samples

	U.S. (n=306)		China (n=342)	
	n	%	n	%
Gender				
Male	148	48.4	119	34.8
Knowledge about GM				
Know a lot	4	1.3	9	2.6
Know some	97	31.7	187	54.7
Know very little	205	67	146	42.7
GM in the curriculum				
Have taken GM-related courses	11	3.6	114	33.3
Will take GM-related courses	12	3.9	13	3.8
Will not take GM-related courses	239	78.1	206	60.2
Have no idea	44	14.4	9	2.6
Frequency of exposure to GM information				
Never heard about it	36	11.8	0	0
Hear about it a few times a year	186	60.8	156	45.6
Hear about it about once a month	58	19.0	131	38.3
Hear about it several times a month	24	7.8	49	14.3
Hear about it several times a week	2	0.7	6	1.8

Table 2. Continued Gender, knowledge, and GM information in the samples

	U.S. (n=306)		China (n=342)	
	n	%	n	%
GM information sources				
Department of Agriculture	25	8.2	63	18.4
News reports	192	62.7	304	88.9
Social networking sites	71	23.2	185	54.1
Taught in school	89	29.1	163	47.7
Interpersonal communication	96	31.4	134	39.2
Academic literature	45	14.7	93	27.2
Other sources	11	3.6	14	4.1
Don't get any information at all	61	19.9	1	0.3
Average number of information sources		1.72		2.79

Table 3 lists the means and the standard deviations for all scales used in this study. It shows that the Chinese sample held stronger conspiracy beliefs and lower levels of trust in experts and in the media compared to their U.S. counterparts. The difference between the two groups with respect to trust in government was not statistically significant. Thus, H11 was supported. The Chinese students did report higher levels of risk perception but also higher levels of benefits perception than U.S. students, and these differences were statistically significant. Figure 3 shows a plot of American and Chinese students' attitudes, based on their levels of perceived risks and benefits. As Figure 3 indicates, American

respondents fall in the upper left quadrant (using a value of four as the axis), which can be considered a positive attitude, whereas Chinese respondents fall in the upper right quadrant, which can be interpreted as an ambivalent attitude toward GMO. In other words, H13 was not supported. Other results from Table 3 indicate that the Chinese respondents showed statistically significant lower levels of sense of control and higher levels of cynicism. The difference between the two groups in terms of willingness to purchase GM products was significant at α=0.1 level. Thus, H14 was supported. Chinese respondents had lower intentions to consume GM products.

Table 3. Mean and Standard Deviations for the scales

	U.S.		China		
	M	SD	M	SD	t value
Conspiracy beliefs	3.12	1.08	4.08	1.05	-8.11***
Risk perception	3.94	1.02	4.15	0.85	-2.05*
Benefit perception	4.73	0.89	5.04	0.92	-2.94**
Trust in experts	4.46	0.87	4.12	0.86	3.50**
Trust in government	3.97	1.12	3.86	1.07	0.83
Trust in media	3.55	0.81	3.12	0.76	4.92***
Sense of control	5.35	1.07	4.08	0.86	13.01***
Cynicism	3.80	1.16	4.12	1.09	-2.55**
Intention to purchase	3.00	0.88	2.84	0.84	1.67*

One-tail t-test; * Significant at the 0.05 level; ** Significant at the 0.01 level; *** Significant at 0.001 the level.

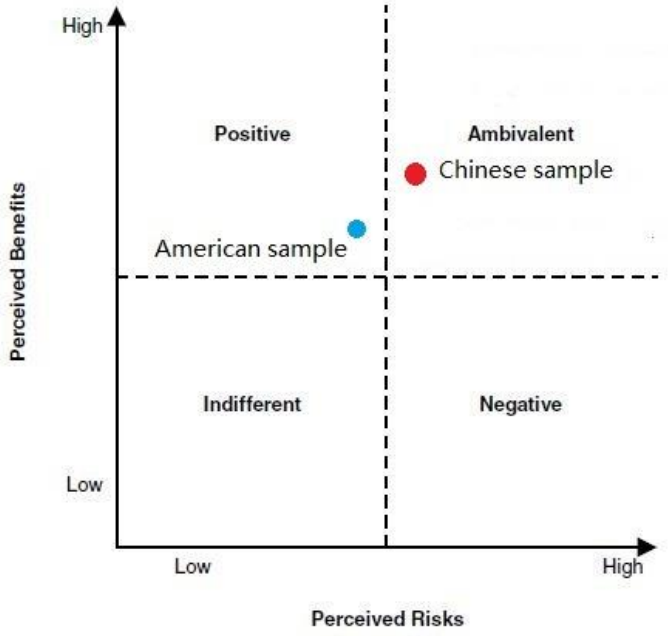

Figure 3. Attitudes as a function of perceived risks and benefits

Correlation Analysis

Bivariate correlation analyses were conducted to explore the relationship between the variables. The results for the American and the Chinese samples are shown in Tables 4 and 5, respectively. In general, the two samples exhibited common patterns, including support for H1, H2, H3, H7, H8, H9, and H10. The correlations differed markedly, however, in several ways. In the U.S. sample, the data show that trust in media negatively correlated with conspiracy beliefs, positively correlated with benefits perception, and negatively correlated with risk perception. These findings suggest that media reports weaken risk perception and counter conspiracy thinking. However, trust in media played an opposite

role in China. In the Chinese sample, trust in media positively correlated with conspiracy beliefs, and was associated with lower benefits perception and higher risk perception. In short, media reports in China tended to amplify risk perception. Furthermore, trust in government was positively associated with benefits perception in the American sample, a relationship that was not observed in the Chinese sample. In other words, these correlations provide only partial support for H4, H5, and H6.As expected, risk and benefits perceptions were negatively correlated in the American sample, but not so in the Chinese sample. This suggests that Chinese respondents hold more ambivalent attitudes toward GM crops.

Table 4. Correlation table for the American sample

Variable	1	2	3	4	5	6	7	8	9
1. Conspiracy beliefs	- -								
2. Benefits perception	-.340**	- -							
3. Risks perception	.598**	-.277**	- -						
4. Trust in experts	-.551**	.433**	-.556**	- -					
5. Trust in government	-.372**	.308**	-.417**	.522**	- -				
6. Trust in media	-.206**	.162**	-.237**	.241**	.450**	- -			
7. Sense of control	-.129*	-.062	-.136*	.084	.017	.061	- -		
8. Cynicism	.179**	-.035	.122*	-.149**	-.304**	-.320**	-.192**	- -	
9. Intention of purchase	-.356**	.318**	-.367**	.432**	.305**	.089	.008	.028	- -

*Significant at the 0.05 level; **Significant at 0.01 the level

Table 5. Correlation table for the Chinese sample

Variable	1	2	3	4	5	6	7	8	9
1. Conspiracy beliefs	- -								
2. Benefits perception	-.281**	- -							
3. Risks perception	.548**	.005	- -						
4. Trust in experts	-.556**	.255**	-.473**	- -					
5. Trust in government	-.213**	.061	-.249**	.447**	- -				
6. Trust in media	.094	-.201**	-.064	.112*	.372**	- -			
7. Sense of control	-.120*	.054	-.023	.076	.103	.056	- -		
8. Cynicism	.127*	.138*	.076	-.137*	-.257**	-.137*	-.191**	- -	
9. Intention of purchase	-.442**	.257**	-.340**	.393**	.169*	-.126*	.012	-.033	- -

*Significant at 0.05 the level; **Significant at the 0.01 level

Structural Equation Model

To determine the relationships between the variables identified in the conceptual framework and the path of influence leading to people's willingness to purchase GM foods, structural equation modeling was applied. SEMs combined path analysis and factor analysis to allow modeling of multiple dependent variables, estimation of their direct and indirect effects on risks/benefits perception, and measurement of unobserved general social trust. A good fitting model means that my theoretical analysis closely matches my empirical data. The model estimation method is default maximum likelihood. Factor scores which were generated through CFA were entered in the SEM model for parameter estimation. The major assumptions associated with structural equation modeling include: multivariate normality, no systematic missing data, sufficiently large sample size, and correct model specification. Q-Q plots showed that the factor scores for each variable fit in a straight line, which suggested that these variables did not violate the assumption of multivariate normal distribution. Both samples reached large enough size, and there were very few observations with missing values, and these cases were simply deleted from SEM analysis.

The American sample. A chi square goodness of fit test showed high values that were significantly different from zero, indicating that the theoretical model predicting perceptions of risk and benefits did not fit the data. The Root Mean Square Error of

Approximation (RMSEA) was higher than the acceptable boundary of 0.10. Moreover, the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) were all lower than 0.90, also suggesting unsatisfactory model fit (Figure 4).

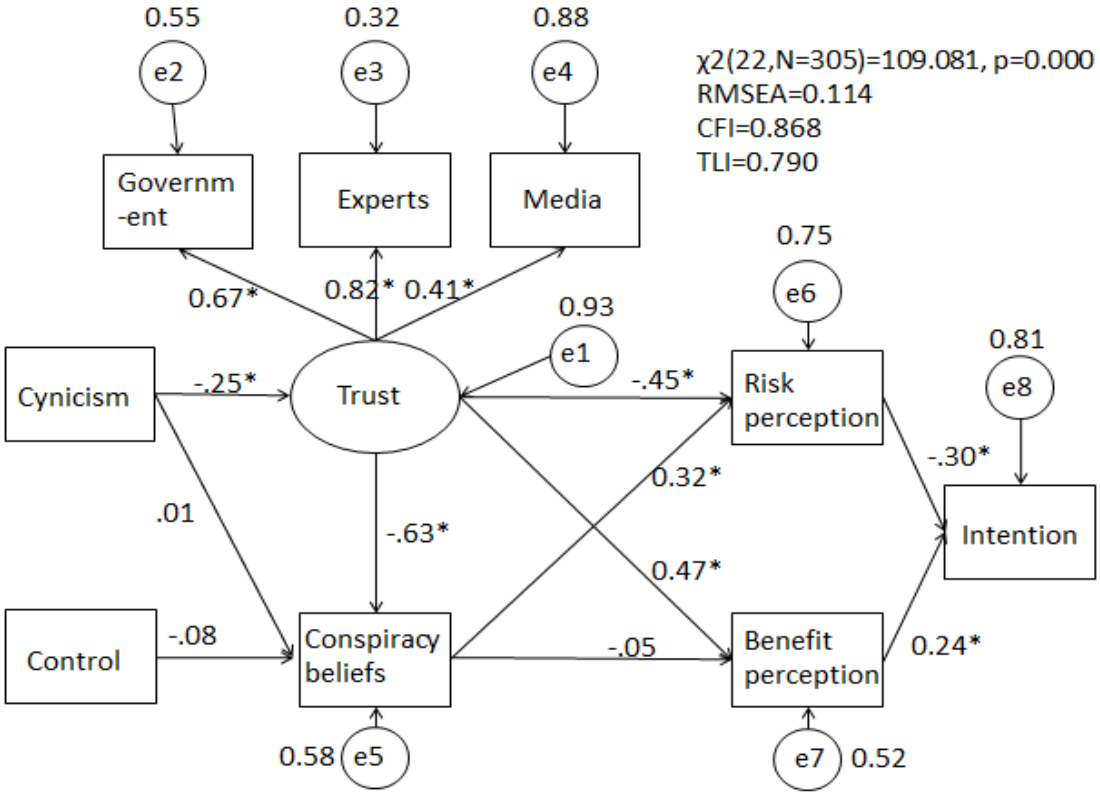

Figure 4. Standardized estimation of the theoretical model for the American sample

The path analysis results shown in Figure 4 offer a number of insights. First, they suggest that trust in experts best represents the more complex construct, social trust, and that trust in media is not closely related to social trust. Second, cynicism is not a good indicator of conspiracy thinking when sense of control is included in the model. Third, conspiracy beliefs

positively correlated with risks perception, but did not appear to have a significant impact on benefits perception in the context of this model.

The Chinese sample. The theoretical model did not register any fit with the data from China. The chi square value was very high and two fitness indices (CFI and TLI) were much lower than the acceptable boundaries. Figure 6 indicates that trust in experts best represented social trust in this case, and that trust in media was not related to social trust at all. Further residual analysis indicated a strong correlation between cynicism and benefits perception, which was difficult to explain.

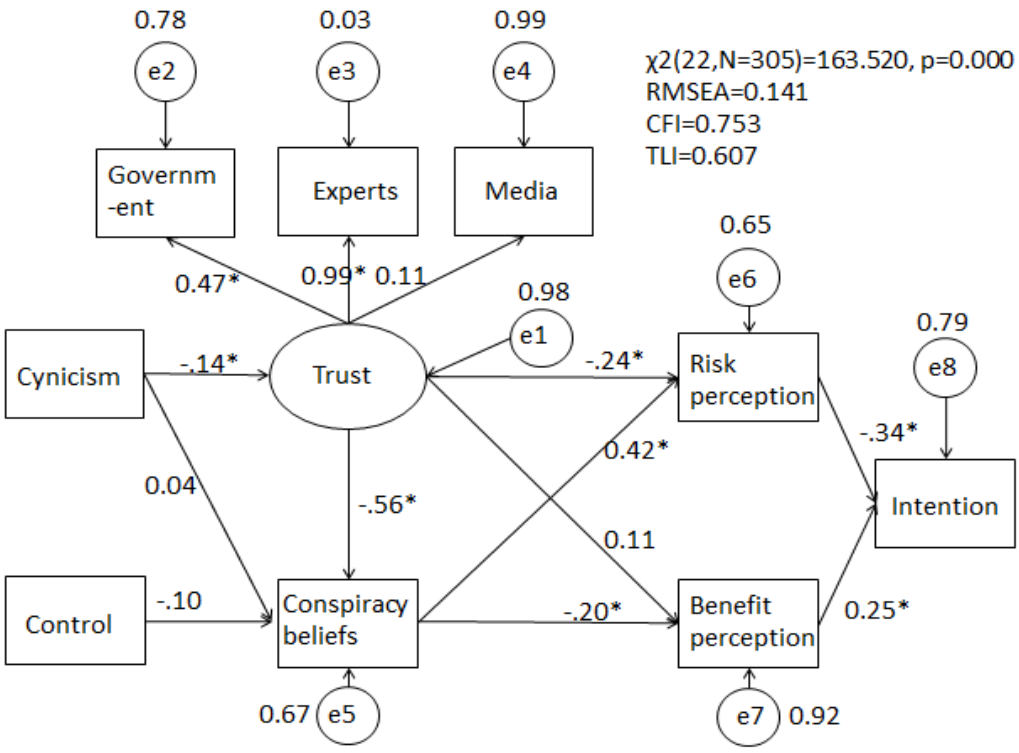

Figure 5. Standardized estimation of the theoretical model for the Chinese sample

Revised path model

Neither of the two theoretical models above demonstrated satisfactory fit, which indicated that my theory framework did not closely match the reality. Judging from the results above and the residual matrices, I gave up SEM and developed a simple path model. In this model, trust in government and media were dropped, because only trust in experts worked best for both counties and was the most relevant kind of trust regarding attitudes toward GMO. Cynicism was closely tied to trust in government, so it was dropped, since trust in government was not directly relevant to GMO. Sense of control did not seem relevant to conspiracy beliefs about GMO, so it was dropped also. Residual matrices showed that trust in experts and conspiracy beliefs might both directly and indirectly influence intentions to purchase. The error term of risks perception and benefits perception were correlated in the Chinese sample.

The revised path model proved a perfect fit. The results of the path model overturned conclusions from a previous study that attitude toward GMO is almost fully mediated through risk and benefit perception (Moon & Balasurbramanian, 2004). Both the American and Chinese samples there was direct influence from trust in experts and/or conspiracy beliefs. For American sample, trust in experts was an even stronger predictor of intention to purchase GM foods than risk and benefit perception, while conspiracy beliefs were not

significant. For the Chinese sample, the strength of conspiracy beliefs was the strongest predictor of intention, while benefit perception did not explain the intention of purchase GM foods. The power of equations to explain the variance of risk and benefit perception was weaker for Chinese sample. Furthermore, in the Chinese sample there was a significant correlation between the error terms of risk and benefit perception. While Chinese participants had higher levels of conspiracy beliefs, it is interesting to note that the impact of conspiracy beliefs on risk and benefit perception was stronger for Americans. In other words, H12 was not supported.

Table 5. A summary of paths in the two empirical models

	American sample	Chinese sample
Structural model		
Conspiracy beliefs←		
Trust in experts	-.551**	-.530**
R^2	.303	.281
Benefit perception ←		
Conspiracy beliefs	-.154*	-.120
Trust in experts	.352**	.178**
R^2	.202	.068
Risk perception ←		
Conspiracy beliefs	.424**	.264**
Trust in experts	-.319**	-.276**
R^2	.403	.228
Intention of purchase ←		
Trust in experts	.244**	.169**
Conspiracy beliefs	-.091	-.281**
Benefit perception	.140**	.070
Risk perception	-.141*	-.153**
R^2	.233	.255
Covariance		
e. risk perception e. benefit perception	0.01	0.13**

*Significant at 0.05 level **Significant at 0.01 level

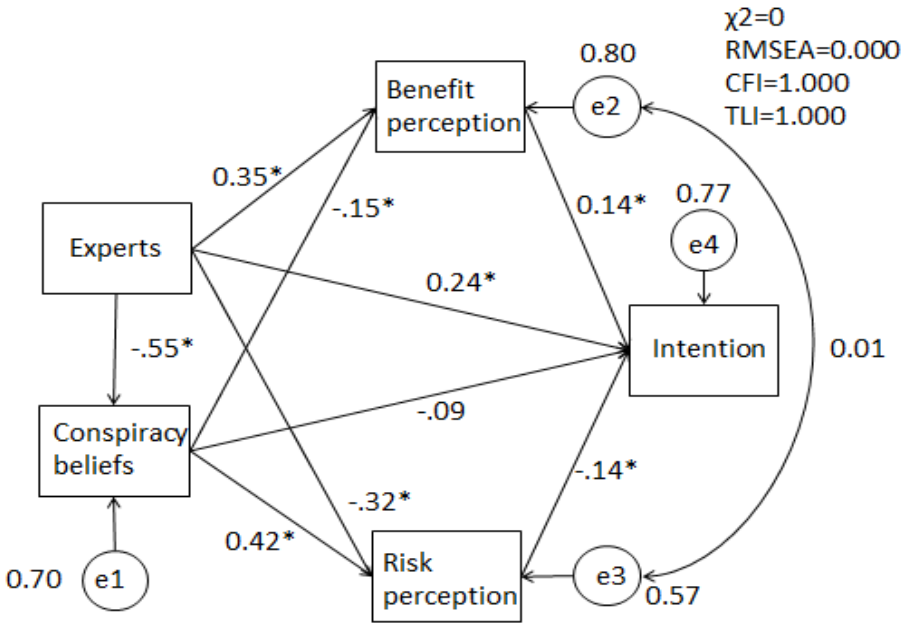

Figure 6. Standardized estimation of the empirical model for the American sample

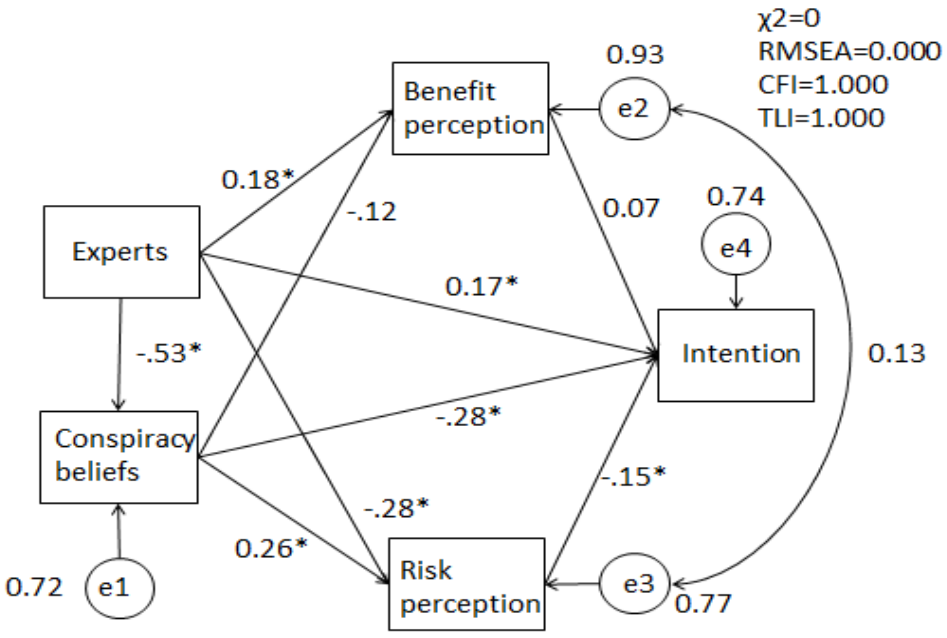

Figure 7. Standardized estimation of the empirical model for the Chinese sample

Summary

Table 6 summarizes the results of hypotheses testing.

Table 6. The summary of the results of hypotheses testing

Hypothesis	**Result**
H1: Higher levels of cynicism lead to stronger conspiracy beliefs.	Supported
H2: Higher levels of cynicism lead to lower levels of social trust	Supported
H3: Higher levels of control will depress conspiracy beliefs.	Supported
H4: Lower levels of social trust lead to stronger conspiracy beliefs.	Partially supported
H5: Higher levels of social trust lead to higher levels of perceived benefits of GMOs.	Partially supported
H6: Higher levels of social trust lead to lower levels of perceived risks related to GMOs.	Partially supported
H7: Stronger conspiracy beliefs lead to lower levels of perceived benefits of GMOs.	Supported
H8: Stronger conspiracy beliefs lead to higher levels of perceived risks related to GMOs.	Supported
H9: Higher levels of perceived risks are associated with lesser willingness to purchase GM foods.	Supported
H10: Higher levels of perceived benefits are associated with greater willingness to purchase GM foods.	Supported
H11: The Chinese sample will show stronger conspiracy beliefs and lower levels of social trust.	Supported
H12: The effect of strength of conspiracy beliefs on risk perception and benefit perception will be stronger among the Chinese respondents.	Not supported
H13: The Chinese sample will perceive more risk and less benefit related to GMOs compared to the American sample.	Partially supported
H14: In general, the Chinese sample will hold a less positive attitude toward GMOs than the American sample.	Supported

CHAPTER 5

CONCLUSIONS

This comparative study reveals some inner mechanisms of how American and Chinese consumers develop perceptions of risk and benefits related to GM crops. The findings showed that the Chinese participants were more involved in the GM issue than their American counterparts. They also reported more sources of information from which they learn about the topic more frequently. This may be due to a higher density of media coverage in early September 2012, triggered by the controversial American-led experiment with golden rice that rekindled yet again the long-standing debate about the risks and benefits of GM products in the country. The American respondents demonstrated lower levels of both risk and benefits perception probably resulting from their lesser involvement with the issue. Despite this, the Americans expressed higher acceptance of GM crops.

The findings also show that holding conspiracy beliefs about GM crops is a powerful predictor of risk and benefits perceptions. Specifically, strong conspiracy beliefs led to low perceptions of GM crops' benefits and high perception of risks attendant to their consumption.

The findings support previous studies' conclusions (e.g., those of Titchener & Sapp, 2002; Slovic, 1993; Chen & Li, 2006) about the causality between social trust and risk and benefit perceptions, specifically suggesting that higher levels of social trust lead to stronger benefits perception and weaker perceptions of risk. Trust in experts was found to be most closely related to perceptions of risk and benefits.

The influence of personality traits on conspiracy beliefs was partially verified. That is, lower levels of sense of control tended to strengthen conspiracy beliefs, but the influence of cynicism was not significant when trust in the three institutions was controlled for. This study also found personality variables were not strong predictors of attitudes toward GM crops, and these variables were dropped in the revised path model.

Finally, the results indicate that cultural factors have a bearing on the strength of the coefficients. Trust in experts, the government, and the media appeared to be strong dimensions of social trust in the American context. In China, however, trust in media did not help to bolster social trust. Because social trust was the most important determinant of risk perception in the U.S. sample, cultivating social trust appears to be the most direct and effective way of enhancing the acceptance of GM technology. The Chinese situation is more complex. The results indicate that to improve the public's acceptance of GM crops, repelling conspiracy beliefs is the most important and urgent task. To do this, an indirect but

fundamental approach is to strengthen the credibility of government, experts, and the media. Another approach would be to "inoculate" the public against conspiracy thinking. This might be done by first alerting the public to the threat of conspiracy beliefs, and then providing them with specific refutations to the potential conspiracy messages they may receive.

This study partially revises Costa-Font's (2009) model of people's acceptance of GM foods as determined by risk and benefits perception. Rooted in classic economic theories, this model assumes that individuals are rational decision-makers intent on maximizing the utility of products and services. Although the Chinese respondents did not disproportionately perceive more risks than benefits from GM crops in the present study, their willingness to consume GM foods was, however, significantly lower than that of the Americans. This suggests that the way people make choices about the food items they consume is more complex, apparently relying on more than risk and benefits perceptions. Modes of thinking, including the degree to which people cling to conspiracy beliefs, may distort risk and benefit evaluations.

In summary, the Chinese respondents in the present study expressed less willingness to purchase GM crops and GM products. The structural model of influence resulting from empirical data suggests that the Chinese exhibited higher levels of risk perception and

benefits perception, stronger conspiracy beliefs, and weaker social trust. This finding lends support to the significance of social trust as an antecedent of risk and benefits perceptions. More importantly, however, it adds to the body of literature by placing conspiracy beliefs into consideration.

Implications of the Findings to Theory and Practice

Most studies in the Western world emphasize the need for a more participatory dialogue among stakeholders to arrive at a consensus about measures that should be taken to ensure public safety as GM crops become common ingredients of food items. The findings of the present study indicate that public acceptance of GM foods in developing countries may be embedded in broader themes such as perceived inequality, power imbalance between and among nations separating the "haves" and "have nots," and the clamor for political reforms in the domestic sphere. The findings for China imply that there is no "one size fits all" strategy to enhance the acceptance of GM crops.

This study also broadened the study of the impact of conspiracy beliefs and conspiracy thinking to how people come to accept or reject scientific innovations. People hold conspiracy beliefs not only about political events, but also about what may result from the adoption of new technology in an age of globalization. The Chinese respondents reported

stronger conspiracy beliefs than the Americans in this study, a pattern that may be manifested in any comparison of consumer propensities in developing and developed societies.

Limitations of the Study and Suggestions for Future Research

This study has four major weaknesses. The first is the bias introduced in the sampling strategy because (1) respondents were recruited from few universities; (2) a large proportion of the American respondents were social science majors; and (3) the American respondents received incentives for their participation while the Chinese respondents did not. Second, the study did not take into account the quality of information derived from different sources. It also did not ascertain how often the respondents get information from one particular source and how satisfied they were with that source. Future studies should determine the role of each particular source in cultivating social trusts and conspiracy beliefs. Third, the Chinese universities blocked the invitations to participate sent via the software system, thus precluding the sending of reminders to encourage participation or the calculation of an accurate response rate. Fourth, the present study offered few clues as to why the Americans reported lower levels of conspiracy beliefs. Is this due to higher levels of social trust or simply because GMOs are considered to be American (i.e., ingroup) products?

Further research could achieve greater external validity by using a probability sample. The study's framework could be replicated in other countries, making it possible to draw

valid comparisons between and among developing and developed nations. Qualitative methods could probe deeply how and why people, especially those with great potential to serve as opinion leaders, succumb to conspiracy beliefs. Experimental designs would be able to detect the degree to which conspiracy beliefs can distort risk perception. The results of these kinds of studies would further scholars' understanding of people's perceptions of risks and benefits, and could assist in the development of strategies that enhance the dialogue between and among stakeholders.

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APPENDIX A

RESULTS OF CONFIRMATORY FACTOR ANALYSES

Summary of items and factor loading for perceived risks

Item	American sample		Chinese sample	
	Factor loading	Uniqueness	Factor loading	Uniqueness
1. Multinational corporations which produce GM seeds will increasingly control farming.	.592	.549	.573	.596
2. GM crops carry genes from different species that will cause harm to the human body.	.758	.426	.661	.563
3. Genetic engineering will result in immoral consequences.	.793	.372	.636	.595
4. When pollen from GM plants cross-pollinate with other crops, weird hybrids will result.	.753	.433	.636	.595
5. The widespread use of GM crops will harm biodiversity.	.796	.366	.698	.513
Eigenvalue	2.754		2.457	
% of variance	55.074		49.137	

Summary of items and factor loading for perceived benefits

Item	American sample		Chinese sample	
	Factor loading	Uniqueness	Factor loading	Uniqueness
1. Some varieties of GM crops will cut down pesticide use.	.708	.499	.756	.428
2. Some varieties of GM crops will cut down fertilizer use	.726	.473	.730	.467
3. By increasing per unit yield, GM crops will increase the efficiency with which people use their land.	.793	.371	.786	.382
4. GM crops will reduce the production costs for farmers.	.633	.599	.762	.419
5. GM crops will reduce the price of food items for consumers.	.560	.687	.640	.590
6. Adopting GM crops will feed the growing population in the developing world.	.663	.560	.649	.579
7. Planting more GM crops will increase the yields.	.729	.469	.662	.562
Eigenvalue	3.342		3.571	
% of variance	47.750		51.010	

Summary of items and factor loading for conspiracy beliefs

Item	American sample		Chinese sample	
	Factor loading	Uniqueness	Factor loading	Uniqueness
1. GMOs were originally invented as a weapon for biological warfare.	.586	.656	.552	.696
2. People who regularly consume GM food will suffer from stunted physical growth or reproductive harm.	.772	.404	.686	.529
3. The true test results of the effects of GM crops on human health are being kept secret.	.823	.322	.649	.589
4. Giant multinational corporations that produce GM seeds want to destroy organic or ecological agriculture for their benefit.	.790	.376	.797	.364

5. Countries that export GM seeds want to take over global agriculture.	.791	.374	.788	.379
6. Government officials who promote GM crops work hand-in-hand with giant biotech companies.	.822	.325	.727	.472
Eigenvalue	3.542		2.980	
% of variance	59.037		49.672	

Summary of items and factor loading for trust in experts

Item	American sample		Chinese sample	
	Factor loading	Uniqueness	Factor loading	Uniqueness
1. Scientists and experts who work on genetic engineering can be trusted about the GM issue.	.625	.610	.750	.437
2. On the GM crops issue, scientists stand for the truth, rather than the interest of certain groups.	.707	.500	.598	.642
3. GM crops have undergone rigorous scientific testing and are therefore safe.	.712	.493	.789	.378
4. Although there may be some uncertainties related to GM products, scientists can deal with them accordingly.	.777	.396	.754	.431
5. The way scientist are conducting research on GMOs will have disastrous effects.	.747	.441	.612	.638
6. Scientists and experts who study GMOs care more about their reputation than the public good.	.636	.596	.562	.654
Eigenvalue	2.963		2.690	
% of variance	49.391		44.830	

Summary of items and factor loading for trust in government

Item	American sample		Chinese sample	
	Factor loading	Uniqueness	Factor loading	Uniqueness
1. The government cares about what people think about GM crops.	.755	.430	.644	.585
2. The government is acting in the public interest with regard to GM crops.	.853	.273	.832	.308
3. The government gives high priority to the people's well-being.	.865	.252	.860	.260
4. The government has done a good job in the past with regard to GM crops.	.820	.328	.829	.312
5. In general, official government reports about GM crops are credible.	.834	.305	.829	.313
6. The government is competent enough to deal with GM crops.	.851	.275	.811	.342
Eigenvalue	4.136		3.879	
% of variance	68.937		64.652	

Summary of items and factor loading for trust in media

Item	American sample		Chinese sample	
	Factor loading	Uniqueness	Factor loading	Uniqueness
1. The media usually ignore important problems related to GM crops.	.594	.645	.596	.645
2. When reporting about GM crops, the media often take the comments and opinions of information sources out of context.	.646	.583	.738	.455
3. Media reports about GM crops are reliable.	.784	.385	.753	.433
4. Criticisms of GM crops in the media are expressed in an adequate manner.	.752	.435	.730	.467
5. Reports about GM issues in the media are not biased in favor of any person or interest group.	.811	.343	.692	.521
Eigenvalue	2.610		2.678	
% of variance	48.194		49.556	

Summary of items and factor loading for cynicism

Item	American sample		Chinese sample	
	Factor loading	Uniqueness	Factor loading	Uniqueness
1. In today's society, corruption is inevitable if you want big achievements.	.617	.619	.584	.659
2. I basically believe the world is an unjust place.	.641	.589	.606	.533
3. All politicians are bad; some are just worse than others.	.815	.335	.784	.385
4. No one can hope to stay honest once he/she enters politics.	.853	.273	.834	.305
5. If politicians stick to their ideas and principles, they are unlikely to reach the top of their profession.	.789	.377	.755	.431
Eigenvalue	2.807		2.587	
% of variance	59.150		51.737	

Summary of items and factor loading for sense of control

Item	American sample			Chinese sample		
	Factor loading*		Unique-ness	Factor loading*		Unique-ness
1. I can do just about anything I really set my mind to.	.518	.497	.485	.426	.722	.293
2. There is really no way I can solve some of the problems I have (reverse scored).	.716	.030	.487	.588	-.189	.619
3. What happens to me in the future mostly depends on me.	.520	.637	.323	.549	.605	.507
4. I have little control over things that happen to me (reverse scored).	.713	.086	.484	.701	.032	.332
5. I often feel helpless in dealing with my problems (reverse scored).	.710	-.491	.255	.760	-.324	.318
6. There is little I can do to change many of the important things in my life (reverse scored).	.757	-.426	.245	.712	-.429	.307
Eigenvalue	2.637	1.084		2.405	1.213	
% of variance	43.945	18.068		40.086	20.218	

***Two factors were extracted.**

APPENDIX B

STUDY QUESTIONNAIRE

What is your gender? (你的性别是什么？)

1. Male（男）
2. Female（女）

What is your college classification? （你的年级是？）

1. Freshman （大一）
2. Sophomore （大二）
3. Junior （大三）
4. Senior （大四）
5. Others （其他）

What was your family's combined household income before taxes in 2011? (你家 2011 年的税前总收入大约是多少？如果你不知道，请估计一个数值。)

1. Lower than $10,000（少于 10000 元）
2. From $10,000 to $19,999（10000 元至 19999 元）
3. From $20,000 to $29,999
4. From $30,000 to $39,999
5. From $40,000 to $49.999
6. From $50,000 to $59,999
7. From $60,000 to $69,999
8. From $70,000 to $79,999
9. From $80,000 to $99,999
10. From $100,000 to $119,999
11. From $120,000 to $139,999
12. From $140,000 to $159,999
13. $160,000 and above（大于 160000 元）

14. I don’t know（我不知道）
15. Refuse to answer（拒绝回答）

How much do you know about GM technology? You define yourself as one who: （你觉得你是一个）

1. Knows a lot about GM technology （对转基因技术了解很多的人）
2. Knows some about GM technology （对转基因技术有一些了解的人）
3. Knows very little about GM technology （对转基因技术所知甚少的人）

Does your curriculum include any course that discusses GM technology? （你的课程设置中是否有课程涉及转基因技术？）

1. Yes, I have taken these courses. （是，我已经上过该部分课程）
2. Yes, but I haven't taken these courses yet.（是，但我还没有上过该部分课程）
3. No, my curriculum does not include such courses. （否，我的课程设置中不包含这些内容）
4. I don’t know or I am not sure. （我不确定）

How often do you read or hear about genetic engineering, GM technology, or GM crops? （你听到或读到关于基因工程、转基因技术、转基因作物的频率是多少？）

1. Never heard about it （从来没有听到过）
2. Very rarely, about once or twice a year （非常少，每年一两次）
3. About once a month （大约每月一次）
4. Several times a month （每月数次）
5. Several times a week or more frequently than that. （每周数次或者更频繁）

Through what sources do you get information about GM crops? (Please circle all that applies.) （通过以下哪些途径你获取有关转基因作物的信息？本题可多选）

1. Official reports from the Department of Agriculture （农业部的官方报告）
2. News reports （新闻报道）
3. Social networking sites (Facebook, Twitter, etc.) （社交网络，例如人人网，微博）
4. Taught in school （学校授课）
5. Personal communication （私人交谈）
6. Scientific journals and literature （学术文献）

7. Other methods, please specify_____ （其他途径，请说明）

To what extent do you agree with the following statements? （你在多大程度上同意下列陈述？）

	Strongly disagree （非常不同意）						Strongly agree （非常同意）
1. GMOs were originally invented as a weapon for biological warfare. 转基因作物起初是作为生物武器研究出来的。	○	○	○	○	○	○	○
2. People who regularly consume GM food will suffer from stunted physical growth or reproductive harm. 经常摄入转基因食品会导致生长迟缓或生殖损伤。	○	○	○	○	○	○	○
3. The true test results of the effects of GM crops on human health are being kept secret. 转基因作物对于健康的影响的真实研究结果未被公之于众。	○	○	○	○	○	○	○
4. Giant multinational corporations that produce GM seeds want to destroy organic or ecological agriculture to protect their benefits. 生产转基因种子的巨头企业想要毁掉有机农业/生态农业来保障它们的利益。	○	○	○	○	○	○	○
5. When some countries that export GM seeds want to take over global agriculture. 当一些国家出	○	○	○	○	○	○	○

口转基因种子时，它们想要控制全球农业。							
6. Those officials who promote GM crops work hand-in-hand with giant biotech companies. 那些推广转基因作物的政府官员一定和生物巨头走的很近。	○	○	○	○	○	○	○

The following are scenarios some have predicted following a country's adoption of GMOs. How likely do you think the following will occur? （以下是对于采用了转基因生物之后的一些预测后果，你觉得这些后果有多大的可能性会出现？）

	Very unlikely（非常不可能）						Very likely（非常可能）
1. GM crops could increase farm yields. 种植转基因作物可以增加产量。	○	○	○	○	○	○	○
2. Adopting GM crops is a way to feed the growing population in the developing world. 采用转基因作物是满足发展中国家不断增长的人口的一种办法。	○	○	○	○	○	○	○
3. GM crops could cut down pesticide use. 转基因作物可以降低杀虫剂的使用量。	○	○	○	○	○	○	○

4. GM crops could cut down fertilizer use. 转基因作物可以降低化肥的使用量。	○	○	○	○	○	○	○
5. By increasing per unit yield, GM crops can increase the efficiency with which farmers use their land. 通过增加每单位面积的产量，转基因作物可以使人们更有效的使用土地。	○	○	○	○	○	○	○
6. GM crops can reduce farmers' production costs. 转基因作物可以降低农民的生产成本。	○	○	○	○	○	○	○
7. GM crops can reduce the price of food items for consumers. 转基因作物可以为消费者降低食品价格。	○	○	○	○	○	○	○
8. Genetic engineering is immoral. 基因工程是不道德的。	○	○	○	○	○	○	○
9. When pollen from GM plants cross-pollinate with those of other crops, weird hybrids will result. 当转基因植物的花粉传给其他植物时，可能会导致怪异的杂交。	○	○	○	○	○	○	○
10. The widespread use of GM crops will harm biodiversity. 广泛种植转基因作物会损害生物多样性。	○	○	○	○	○	○	○

11. GM crops carry genes from different species that will cause harm to human health. 转基因作物携带的其他物种的基因会损害人类健康。	○	○	○	○	○	○	○
12. Multinational corporations that produce GM seeds are increasingly controlling farming. 生产转基因种子的跨国企业正强化对于农业的控制。	○	○	○	○	○	○	○
13. Please drag the slide to 7 (very likely) and move to the next page. 请将滑块拖曳到 7“非常可能”并进入下一页	○	○	○	○	○	○	○

How much do you agree with the following statements?（你在多大程度上同意下列陈述？）

	Strongly disagree（非常不同意）						Strongly agree（非常同意）
1. Scientists and experts who work on genetic engineering can be trusted about the GM issue. 致力于基因工程的科学家和专家在转基因问题上是可以信赖的。	○	○	○	○	○	○	○
2. On the GM crops issue, scientists stand for the truth, rather than the interest of certain groups. 在转基因作物的问题上，科学家代表的是真理而不	○	○	○	○	○	○	○

是某一群体的利益。							
3. GM crops have undergone rigorous scientific testing and are therefore safe. 转基因作物经过了严格的科学检验，因而是安全的。	○	○	○	○	○	○	○
4. Although there may be some uncertainties related to GM products, scientists can deal with them accordingly. 尽管转基因产品还存在着一些不确定性，科学家有能力很好地处理它们。	○	○	○	○	○	○	○
5. The way scientist are conducting research on GMOs will have disastrous effects. 科学家研究转基因生物会带来灾难性的后果。	○	○	○	○	○	○	○
6. Scientists and experts who study GMOs care more about their reputation than the public good. 那些被称为学者和专家的转基因生物研究者，比起公共利益更关心自己的名声。	○	○	○	○	○	○	○

To what extent do you agree with following statements? （你在多大程度上同意下列陈述？）

	Strongly disagree （非常不同意）		Strongly agree （非常同意）

1. The government cares about what people think about GM crops. 政府关注人们对于转基因作物的态度。	○	○	○	○	○	○	○
2. The government is acting in the public interest with regard to GM crops. 政府在转基因作物一事上以公众的利益为准。	○	○	○	○	○	○	○
3. The government gives high priority to the people's well-being. 政府将公众的幸福置于优先位置。	○	○	○	○	○	○	○
4. The government has done a good job in the past with regard to GM crops. 政府在转基因作物一事上一直表现良好。	○	○	○	○	○	○	○
5. In general, official government reports about GM crops are credible. 一般而言，关于转基因作物的政府报告是可信的。	○	○	○	○	○	○	○
6. The government is competent enough to deal with GM crops. 政府有足够的能力处理转基因作物事宜。	○	○	○	○	○	○	○

To what extent do you agree with the following statements? （你在多大程度上同意下列陈述？）

	Strongly disagree （非常不同意）		Strongly agree （非常同意）

1. The media usually ignore important problems on GM crops issue. 媒体在转基因作物一事上经常忽略重要的问题。	○	○	○	○	○	○	○
2. The media often take the comments and opinions of information sources out of context. 媒体经常断章取义。	○	○	○	○	○	○	○
3. Media reports about GM crops are reliable. 媒体对于转基因作物的报道通常是可信的。	○	○	○	○	○	○	○
4. Criticism of GM crops in the media is expressed in an adequate manner. 媒体上的批评是以合适的方式表述的。	○	○	○	○	○	○	○
5. The reports about GM issues in the media are independent and not biased by any interest group. 媒体上对转基因方面的报道是独立的。	○	○	○	○	○	○	○

To what extent do you agree with the following statements? （你在多大程度上同意下列陈述？）

	Strongly disagree （非常不同意）						Strongly agree （非常同意）
1. I keep myself informed about GMOs. 我一直关注关于转基因生物的讯息。	○	○	○	○	○	○	○

2. I would be happy to take part in a public discussion about GM food. 我乐于参与关于转基因食品的公共讨论。	○	○	○	○	○	○	○
3. I would be happy to talk about GM food with my family, friends, and/or colleagues. 我乐于与家人、朋友、同事谈论转基因食品的话题。	○	○	○	○	○	○	○
4. This is a test item, please select “Strongly agree.” 这是一个检验项，请选择“非常同意”	○	○	○	○	○	○	○
5. Genetic engineering interests me. 我对基因工程感兴趣。	○	○	○	○	○	○	○
6. I pay attention to whether the food I eat contains GM ingredients. 我关注食物是否含有转基因成分。	○	○	○	○	○	○	○

To what extent do you agree with the following statements? （你在多大程度上同意下列陈述？）

	Strongly disagree（非常不同意）					Strong agree（非常同意）	
1. In today’s society, corruption is inevitable if you want to have big achievement. 当今社会，要干大事就不可避免要腐败。	○	○	○	○	○	○	○

2. I basically believe the world is an unjust place. 我总体上觉得世界是不公平的。	○	○	○	○	○	○	○
3. All politicians are bad--some are just worse than others. 政治家都是坏的，只不过一些比另一些更坏而已。	○	○	○	○	○	○	○
4. No one can hope to stay honest once he/she enters politics.没人可以指望在步入政界后还保持诚实。	○	○	○	○	○	○	○
5. If politicians stick to their ideas and principles, they are unlikely to reach the top of their profession.如果政治家坚持他们的理念和原则，那么他们就不可能爬到高位。	○	○	○	○	○	○	○

To what extent do you agree with the following statements? （你在多大程度上同意下列陈述？）

	Strongly disagree（非常不同意）					Strong agree（非常同意）
1. I can do just about anything I really set my mind to.只要我想做的事情我都能实现。	○	○	○	○	○	○	○
2. There is really no way I can solve some of my problems . 我有一些问题是我实在没有办法去解决的。	○	○	○	○	○	○	○

3. What happens to me in the future mostly depends on me.我的未来主要由我决定。	○	○	○	○	○	○	○
4. I have little control over things that happen to me. 我对发生在我身上的事情缺少控制。	○	○	○	○	○	○	○
5. I often feel helpless in dealing with problems. 我经常觉得处理生活中的困难是感到无助。	○	○	○	○	○	○	○
6. There is little I can do to change many of the important things in my life. 我几乎没有办法去改变一些生活中的重要事件。	○	○	○	○	○	○	○

With respect to GM crops, what level of restriction do you favor most? （对于转基因作物，下列哪种程度的约束是你最同意的）

1. Ban all GM technology. （禁止所有转基因技术）
2. Apply GM technology only to cotton and flowers. （只能应用于棉花和鲜花上）
3. May be applied to crops used to feed animals. （能应用于喂养动物的作物上）
4. May be applied to fruits and vegetables. （能应用在蔬菜和水果上）
5. May be applied to staple foods. （能应用在人类的主粮上）

Under what situation will you choose the following? （在下列哪一种情况下你不会选择该食品）

1. Food that contains little GM ingredient (e.g., as seasonings.（在调味品中含有少许转基因成分）
2. One of main ingredients is made from GM crops (e.g., the tomato pieces in hamburger). （一项主要原料是由转基因作物制成，例如汉堡中的西红柿片来自转基因西红柿）

3. Most or all of the ingredients are made from GM crops (e.g., soybean oil).（大部分，或者完全由转基因作物制成，例如大豆食用油）
4. I won’t change my shopping habits because some food items may contain GM ingredients.（我不会因为转基因的原因改变我的消费习惯。）

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