Identifying Factors of Millennial Publics Risk Information Seeking and Processing Strategies of Genetically Modified Food

by

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Abstract

Genetically modified crops have been beneficial to farmers in terms of saved time, money, and energy while increasing yields and often times reducing pesticide dependency. These benefits outweigh the increased costs, allowing genetically modified crops to become one of the fastest adopted farm technologies in history. Despite overwhelming approval of genetically modified crops among farmers, consumers have been hesitant to consume genetically modified food. Consumers see genetically modified food as a risk without immediate reward. Millennial consumers are a powerful population segment that rivals or overtakes other population segments in terms of size, influence, and purchasing abilities. Yet, they are often lumped into one homogenous group by marketers when they are a diverse group comprised of unique segments.

The purpose of this study was to better understand how millennial consumers find and process risk information about genetically modified food so that agricultural communicators can better strategize communication efforts. Applying the Situational Theory of Publics and the Risk Information Seeking and Processing Model, this study went one step further by differentiating between Supportive and Non-supportive publics. The research objectives of this study are as follows: 1) Identify the individual characteristics of both Supportive and Non-supportive millennial publics of genetically modified food; 2) Examine relevant channel beliefs of Supportive and Non-supportive millennial publics of genetically modified food; 3) Identify and describe the information gap of Supportive and Non-supportive millennial publics of genetically modified food; 4) Define the perceived information gathering capacity of Supportive and Non-supportive millennial publics of genetically modified food; and 5) Characterize the information seeking and processing behavior of Supportive and Non-supportive millennial publics of genetically modified food. An Internet survey was distributed to individuals between the ages of

18 and 36 within the United States.

The majority of Non-supportive publics had a high level of issue involvement and the majority of Supportive publics had a low level of issue involvement. Meaning, the majority of Non-supportive publics are more active about the issue than Supportive publics. Age was found to be correlated with systematic processing and information avoidance with older millennials more likely to systematically process information and less likely to avoid information. Additionally, this study found that regardless of knowledge level, wealthier individuals who do not support genetically modified food are more likely to be actively involved in the issue and wealthier individuals who support the technology are more likely to be passive about the issue. The majority of millennial publics in all eight groups reported a knowledge deficit to some degree. The research also found that heuristic processing was negatively correlated to systematic processing and higher levels of information avoidance were negatively correlated with lower levels of active information seeking. Non-supportive Active publics (high issue involvement/high knowledge) were found to have the highest mean active information seeking and systematic processing scores and lowest mean heuristic processing and information avoidance scores; supporting past findings that knowledge does not always equate to support and that communication practitioners may have trouble changing the opinion of a large portion of Non-supportive publics.

Keywords: Genetically modified food, Risk Information Seeking and Processing, Situational Theory of Publics, Knowledge Gap, Channel Beliefs, Information Seeking, Information Processing, Millennials

Table of Contents

List of Figures

List of Tables

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Chapter 1 - Introduction

Background

The responsibility of crop breeding and improvement was largely left to farmers until the 19th century (Borlaug, 1983). However, it was Gregor Mendel's discovery of the laws of inheritance in 1865 and their later rediscovery in 1900 that laid the groundwork for genetic improvement of crop plant species through a scientific approach by defining the association of genotype with phenotype (Borlaug, 1983; Shull, 1909). A lot has changed in genetics and crop plant breeding since its birth with Mendel in the 1860s (Dunn, 1965). Typically, the goals of plant breeding with agricultural and horticultural crops have aimed at improving yields, nutritional qualities, and other traits of commercial value (Moose & Mumm, 2008). These have been achieved through techniques such as selective breeding, mutagenesis, and gene transfer. Selective breeding is the purposeful breeding of two crops through conventional techniques to produce genetically superior offspring. Mutagenesis involves the application of radiation or chemicals to mutate the DNA of the seed, but this process is completely random and requires large populations of more than 10,000 plants (Halford, 2012). Gene transfer, also known as genetic modification (GM), is the transfer of a specific gene or genes into the genome of an organism (Halford, 2012).

Genetically modified crops and seed varieties have been largely adopted among farmers, which has caused GM science to become the fastest adopted crop technology with more than 18 million farmers using the technology internationally (Fernandez-Cornejo & Casswell, 2006; Lucht, 2015). In the United States, the adoption rate of genetically modified varieties of cotton, corn, and soybeans among farmers has exceeded 90% (Lucht, 2015). All genetically modified crops can be classified into one of three generations (Fernandez-Cornejo & Casswell, 2006). The

first generation involves crops with enhanced input traits, such as herbicide tolerance, insect resistance, and tolerance to environmental stresses such as drought. Second generation involves varieties with value-added input traits, such as nutrient enhancement. The third generation involves crop varieties that produce pharmaceuticals or improve processing of bio-based fuels, and other products beyond traditional fiber and food. At the moment, the majority of GM crops available for adoption are first generation, but second generation GM crops have recently become available in the form of non-browning apples and bruise-resistant potatoes (USDA, 2016).

Based on the benefits they provide, GM crops can be divided into two groups, those that benefit the producer and those that benefit the consumer (Falk et al, 2002). First-generation input traits are modifications that increase crop yields or protect the crop from stress and benefit the producer (Fernandez-Cornejo & Casswell, 2006). GM varieties that benefit the consumer are modified with output traits and fit into the second generation and third generation (Fernandez-Cornejo & Casswell, 2006). Klümper and Qaim (2014) found that farmers' profits increased by 68%, crop yields rose by 22%, and the expense for pesticides declined by 39% on average when utilizing first-generation GM crops. Thus, farmers profit financially by planting GM crops despite higher seed cost (Klümper & Qaim, 2014). In addition to economic advantages, farmers often have cited other non-financial benefits, such as ease of use, time saved, and more flexibility in their planning (Brookes & Barfott, 2014; Carpenter, 2013; Fernandez-Cornejo, Wechsler, Livingston, & Mitchell, 2014; Qaim, 2009). Klümper and Qaim (2014) found that the adoption of genetically modified crop varieties has allowed farmers to switch to herbicide-tolerant crops with more environmentally friendly herbicides, which can lead to a 41.7% average reduction in the amount of herbicides used. The scientific consensus is that the consumption of genetically

modified foods has not proven to be harmful to human or animal health (Chassy, 2002; Connor, Glare, & Nap, 2003; Delaney, 2015; Flachowsky, Chesson, & Aulrich, 2005). However, consumers perceive a risk to either themselves or the environment (Santaniello, Evenson, & Zilberman, 2002).

Risk perception research has identified individual tolerance levels (Goldstein, Johnson, & Sharpe, 2008) and trust (Knight, 2007; Kuttschreuter, 2006) to be influential in risk perception formation. Additionally, how information about the technology is framed can influence consumer opinions, but can vary based on the individual's pre-existing knowledge (Philips & Hallman, 2013). Additionally, risk perceptions can increase if there are no immediate benefits (Zepeda, Douthitt, & You, 2003), as is the case with genetically modified foods whose benefits have been geared towards farmers rather than consumers (Falk et al., 2016; Fernandez-Cornejo & Casswell, 2006; USDA, 2016).

Additionally, greater amounts of scientific information can result in lower perceptions of risk (Klerck & Sweeney, 2007). However, while information flooding may drive out indecision, it does not always lead to acceptance (Jelsoe, 1997) and can result in increased opposition (Madsen et al., 2003). Therefore, persuading individuals to accept and support genetically modified food is much more complicated than a simple lack of knowledge.

Little research has been done to assess the the knowledge of GM science of specifically Millennials or how they are seeking and processing information about the risks of genetically modified food. Millennials are a young consumer group who have different beliefs and opinions from other generations (Smith, 2011; Tapscott, 1998: Zemke et al., 2000). They are more socially, culturally, and environmentally conscious (Hira, 2007; Sheahan, 2005) and are unique in terms of perspectives, decision-making rationales, and drivers. Additionally, they are an

extremely large group at 1.8 billion people worldwide (United Nations, 2005), are more consumption-oriented than any other generation (Sullivan & Heitmeyer, 2008), and consequently have sufficient purchasing power to significantly impact current and future economies through their purchasing and spending behaviors (Farris et al., 2002). This group often has been described as homogenous by marketers when in fact they are a diverse group composed of many distinctive consumer segments requiring unique marketing and communication efforts (Geraci, 2004).

Audience segmentation is common in communication campaigns where common beliefs, values, and attitudes are shared by these smaller groups (Slater, 1995), allowing for strategic communication efforts (Dibb, 1999). Targeted communication efforts can encourage behavioral change (Kotler, Roberto, & Lee, 2002), which is why the Situational Theory of Publics (STOP) (Grunig, 1983) is especially relevant to millennials. Grunig (1983) found that identifying differences in types of publics could aid in developing more effective and targeted communication efforts. Dewey (1927) first defined the term Publics as groups of people who face the same problem and work together to solve that problem. Grunig and Repper (1992) used that definition to differentiate between publics and stakeholders. Publics develop organically and actively seek out information about an issue from an organization while stakeholders are chosen for marketing and communication efforts (Grunig & Repper, 1992).

There are four different types of publics identified by Grunig (1983): nonpublics, latent publics, aware publics, and active publics. Nonpublics have no exposure to the specific issue or problem, while latent publics are exposed to the issue or problem but do not recognize it as an issue. Aware publics recognize that there is an issue or problem but do not take action, while active publics recognize the issue or problem and take action in response to the issue or problem.

An individual's level of issue involvement, problem recognition, and constraint recognition are what determine the specific public an individual is categorized into (Grunig, 1983). Hallahan (2000) later split the latent public identified by Grunig (1983) into inactive and aroused publics. The aroused publics are characterized by a moderate or high level of issue involvement but low knowledge, while inactive publics are characterized as having low knowledge and low issue involvement.

Table 1.1
Hallahan's Categorization of Publics

	Low Involvement	High Involvement
High Knowledge	Aware Public	Active Public
Low Knowledge	Inactive Public	Aroused Public

The Risk Information Seeking and Processing Model (RISP) also takes into account the risk information seeking and processing behaviors of individuals. People can be influenced by the information seeking and processing behaviors applied to information they encounter (Eagly & Chaiken, 1993; McGuire, 1974; Petty & Cacioppo, 1986). For example, active information seeking is more likely to lead to more effortful systematic processing (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006), which in turn is more likely to lead to more stable attitudes and a greater resistance to change (Eagly & Chaiken, 1993; Eagly & Kulesa, 1997). However, information seeking and processing strategies are often omitted from research models with researchers instead opting to use exposure to risk information as a predictor of what individuals know or feel about risks and their subsequent behaviors (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006).

The RISP model draws upon the Heuristic-Systematic Processing Model (HSM) (Chaiken, 1980) and the Theory of Planned Behavior (Ajzen, 2007; Ajzen & Fishbein, 1980;

Fishbein & Ajzen, 1975). The RISP model explores the factors that predict differential use of systematic and heuristic processing and active information seeking and information avoidance (Griffin, Dunwoody, & Neuwirth, 1999). Additionally, it looks at seeking and processing as dependent rather than independent factors that prompt effortful analytical work in individuals faced with a risk (Cho, Reimer, & McComas, 2015). There are eight factors of the model: 1) individual characteristics, 2) perceived hazard characteristics, 3) affective response to the risk, 4) perceived social pressures to possess relevant information, 5) information sufficiency, 6) one's capacity to learn, 7) beliefs about the usefulness of information in various channels, and 8) information seeking and processing strategies. The first seven influence the eighth factor, information seeking and processing, by whether or not a person will seek out risk information in either routine or non-routine ways and process the information heuristically or analytically (Cho, Reimer, & McComas, 2015; Griffin, Dunwoody, & Neuwirth, 1999). Additionally, information sufficiency, perceived information gathering capacity, and relevant channel beliefs will influence the extent to which an individual will seek risk information routinely or non-routinely and process risk information systematically or heuristically (Griffin, Dunwoody, & Neuwirth, 1999).

Statement of Problem

Thorough safety testing of commercially available genetically modified food has been found to be unrelated to any health issues and is a much more precise and quicker breeding technique than conventional methods, such as selective breeding (Funk & Rainie, 2015; Nicolia, Manzo, Veronesi, & Rosellini, 2014; USDA, 2015; Vain, 2007; Van Eenennaam & Young, 2014). GM science has the potential to produce more food with less resources, making it possible to feed the global population as it increases from 6.9 billion in 2010 to a projected 9.6 billion in 2050 (Kockhar, 2014; Stamm, Ramamoorthy, & Kumar, 2011). Additionally, GM technology

has been used to maintain food product diversity. For example, GM technology was used to save the papaya industry in Hawaii from the papaya ringspot virus and has been identified as a possible viable solution to saving the citrus industry from the citrus greening bacteria (Gonsalves, Ferriera, Manshardt, Fitch, & Slightom, 2000; Korves, 2015; Mahgoub, 2016).

Yet, the technology has met much criticism and resistance as the majority of consumers believe GM foods are not safe for human consumption (Frewer, Scholderer, & Bredahl, 2000; Funk & Rainie, 2015). Some research has shown acceptance of gene technology in Europe and the United States to be dependent on perceived risks and benefits (Frewer et al., 1996, Frewer et al., 1997; Verdurme & Viaene, 2003). Perception of a risk influences attitudes, decision-making, and behavior of consumers, producers, and the public (Lobb et al, 2007; Finucane & Holup, 2005; Frewer, 2003). This is particularly pertinent in the GM science debate, as there are many conflicting claims and counterclaims regarding the potential risks and benefits of the technology.

Purpose and Research Objectives

Much research has been done to examine consumer attitudes toward GM food and GM technology in general, but little has been done to examine how millennial consumers are seeking and processing information about genetically modified foods. Risk scholars have recognized the importance of audience-style explanations of how and why people seek and use information or avoid it (McComas, 2006). Insight into predictors of information seeking and processing about risks are important for future development of communication efforts. These results may indicate how to stimulate people to search for information about the topic and use relevant channels in their information searches (Huurne & Gutteling, 2008). It is hoped that this research will help communicators better target millennial stakeholder groups with tailored messages through their desired channels and consequently communicate better with millennials as their influence and

purchasing power continue to increase.

The purpose of this study was to identify Supportive and Non-supportive millennial publics and the factors that determine how these millennial publics seek and process risk information about genetically modified food. Guided by the Risk Information Seeking and Processing model and the Situational Theory of Publics, the research objectives of this study are as follows:

RO 1: Identify the individual characteristics of Supportive and Non-supportive millennial publics of genetically modified food.

RO 2: Examine relevant channel beliefs of Supportive and Non-supportive millennial publics of genetically modified food.

RO 3: Identify the perceived knowledge gap of Supportive and Non-supportive millennial publics of genetically modified food.

RO 4: Define the perceived information gathering capacity of Supportive and Non-supportive millennial publics of genetically modified food.

RO 5: Characterize the information seeking and processing behavior of Supportive and Non-supportive millennial publics of genetically modified food.

Assumptions

The primary assumption of this study was that millennials had differing opinions, beliefs, knowledge, and experiences in relation to genetically modified food. Research has shown that this consumer group is often treated as a homogenized segment when in reality its members vary greatly (Geraci, 2004). However, little research has been done in relation to millennials and genetically modified food. Additionally, this study assumes millennial respondents will have at least rudimentary knowledge of (i.e., heard of) genetically modified food and access to Internet.

Potential Limitations

One potential limitation to the study was response rate, since online surveys tend to have lower response rates than traditional mail surveys (Dillman, Smyth, & Christian, 2014). However, since paid respondents were collected through Qualtrics, this did not become an issue. Online surveys may also be challenging for populations unfamiliar with the Internet and navigating online survey platforms (Dillman, Smyth, & Christian, 2014). However, this did not become an issue since millennials typically have Internet access with high usage. Additionally, the length of the survey may have been a potential limitation due to the potential for survey fatigue, causing participants to not complete the survey in its entirety (Sheehan, 2001). However, research has shown that forced responses may cause some respondents to drop out of the survey (Dillman, Smyth, & Christian, 2014). Since, survey respondents were collected through Qualtrics, survey responses were forced and fatigue may have played a role in response collection. This may have manifested itself in the form of survey responses randomly guessing answers, which led to the 26.4% who were pulled from the survey for randomly answering questions.

Additionally, the reverse coded filter questions may not have been the most accurate and researchers recommend future research have more direct filter questions. Also, the scale for Relevant Channel beliefs (Cronbachs alpha = .67) fell below the minimum .70 recommended for reliability. This study also asks about channel beliefs, but does not specify what specific media channels millennials find useful or trust.

Chapter 2 - Review of Literature

Introduction

The risks, whether real or perceived, of genetically modified (GM) food have long been debated by scientists and consumers alike. The scientific consensus about GM foods is that while there has been a correlation found between herbicide tolerant crops and herbicide resistance in weeds, there have been no credible studies showing a correlation between consumption of GM foods and harm to human or animal health (Chassy, 2002; Conner, Glare, & Nap, 2003; Delaney, 2015; Flachowsky, Chesson, & Aulrich, 2005; Jonas et al., 2001; Shelton, Zhao, & Roush, 2002). Therefore, current risks and concerns are only perceived (Engeseth, 2000). However, these perceptions can elicit strong positions on whether or not to consume food produced using the technology, causing changes in consumer purchasing decisions and in turn, affecting governmental policies without scientific backing (Klerk & Sweeney, 2007). Therefore, it is important to identify publics of the technology and determine how they are seeking and processing information about it. By understanding the interaction between message characteristics and publics' information processing motivations and capabilities, communicators can better target and formulate messages. Using Griffin, Danwoody, and Neuwirth's (1999) Risk Information Seeking and Processing model and Grunig and Hunt's Situational Theory (1983), this review highlights past findings, investigates different types of perceived risks of GM foods, and analyzes risk information seeking and processing of stakeholder groups of genetically modified foods.

Genetically Modified Crop and Technology Adoption

In 1994, the first genetically engineered food product, the FLAVR SAVR tomato, became available in U.S. grocery stores, having been modified to delay premature fruit softening

(Bruening & Lyons, 2000). Since 1996, insect resistant Bt-cotton and maize, as well as transgenic herbicide tolerant soybeans and oilseed rape, have been planted at an increasing frequency (Fernandez-Cornejo & Casswell, 2006; Lucht, 2015). The adoption rate of genetically modified varieties of maize, cotton, and soybeans has exceeded 90% in the United States. (Lucht, 2015). Similar results have been found for soybeans in Brazil and Argentina, cotton in India and China, and oilseed rape in Canada (James, 2014). Globally, 82% of the total crop area for soybeans, 68% for cotton, 30% for maize and 25% for oilseed rape was planted with GM varieties in 2014 (James, 2014).

Herbicide-tolerant sugar beets set a precedent by achieving an adoption rate of 95% within two years of United States commercialization, while it took herbicide-tolerant soybeans, formerly the most successful GM crop, 15 years to achieve that level of adoption (Dillen, Demont, Tillie, & Rodriguez, 2013). So many farmers switched to the genetically modified variety because the herbicide tolerant-sugar beet facilitated weed control, which allowed farmers to benefit from a reduced number of herbicide treatments, saved both time and expenses, and created higher profits (Dillen, Demont, Tillie, & Rodriguez, 2013). In 1998, transgenic, papaya ringspot-virus (PRSV) resistant papaya trees were introduced in Hawaii during a time when the state's papaya production was on the verge of collapse because of a devastating outbreak of PRSV infections (Gonsalves, Ferriera, Manshardt, Fitch, & Slightom, 2000). The transgenic trees were planted by the large majority of the papaya farmers in almost 90% on the papaya cultivation surface in Hawaii and are credited with saving the Hawaii papaya industry from extinction (Gonsalves C.V. & Gonsalves D., 2014). Genetic modification also has been identified as a likely solution to citrus greening, a disease that is rapidly decimating citrus groves in the United States and other citrus producing countries (Korves, 2015; Mahgoub, 2016).

In addition, GM science has the potential to produce more food with less resources, making it possible to feed the global population that is expected to increase from 6.9 billion in 2010 to 9.6 billion in 2050 (Kockhar, 2014; Stamm, Ramamoorthy, & Kumar, 2011; United States Department of Agriculture, 2014). There is a need for increased efficiency and production of the food supply to properly sustain the expected population (Hofstrand, 2014).

Researchers have extensively studied why farmers continue to select genetically modified varieties or conventional crop varieties. Klümper and Qaim (2014) performed an analysis of 147 agronomic studies and looked at the performance of different GM crops in different agricultural systems in developing and in industrialized countries, and in different world regions. They found that when using genetically modified crops, farmers' profits increased by an average of 68%. Additionally, they found that crop yields increased by 22% and pesticide expenses declined by 39% with the reported increases for yield and profit being generally higher for developing countries than developed countries (Klümper & Qaim, 2014). Farmers profit financially by planting GM crops despite higher seed cost for genetically modified varieties (Klümper & Qaim, 2014). Farmers also cite non-monetary benefits, such as ease of use, saving of time, and more planning flexibility (Brookes & Barfott, 2014; Carpenter, 2013; Fernandez-Cornejo, Wechsler, Livingston, & Mitchell, 2014; Qaim, 2009). The use of genetically modified plant varieties also has led to a reduction in insecticide quantities used on insect-resistant Bt crops of 41.7%, and the ability to switch to more environmentally friendly herbicides with herbicide-tolerant crops (Klümper & Qaim, 2014). Globally, livestock populations are the largest consumers of GM crops, accounting for consumption of 70 to 90% of harvested GM crops (Flachowsky, Schafft, & Meyer, 2012). In the United States, with a high adoption of GM crops, more than 95% of food-producing animals consume genetically modified feed (Van Eenennaam & Young, 2014).

Perceived Risks and GM Foods

Perceived risk is defined as a two-dimensional construct of uncertainty and negative consequences, making it relevant to research of new products like GM food (Bauer, 1960; Mitchell, 1999). Partial ignorance is closely correlated to the concept of perceived risk in such contexts because the probability of occurrence or the consequences are not known with certainty (Bauer, 1960). There are several distinct types of perceived risk associated with the acquisition and use of products, such as financial, performance, physical, psychological, and logical (Jacoby & Kaplan, 1972). Food products are generally regarded as low-involvement purchases with limited decision-making required (Blackwell, Miniard, and Engel, 2001).

However, when it comes to determining consumer acceptance of genetically engineered food products, consumer evaluations of perceived risks and benefits may be a key factor (Falk et al., 2002; Frewer, Howard, & Aaron, 1998; Frewer, Howard, & Shepherd, 1997, Scholderer, Balderjahn, Bredahl, & Grunert, 1999). Hazardous risks of generic GM foods have been identified as a hazard to human health (self or others) and a hazard to the environment (Santaniello, Evenson, & Zilberman, 2002).

According to Burkitt and Bruno (2010), up to 95% of new all products that enter into the market each year eventually fail. This statistic validates why marketing managers are interested in mitigating risk as much as possible. Research in the area of consumer risk perceptions has found that, when faced with uncertainty, consumers often view a new product as either a set of benefits received or as a set of losses avoided (Cox, Cox, & Mantel, 2010; Cox, Cox, & Zimet, 2006). Additionally, individuals generally fall into two subgroups, those who have a tolerance and/or a preference for risk and those who are more cautious and actively avoid risk (Goldstein, Johnson, & Sharpe, 2008). Entrepreneurs have been found to be accepting of risk when

compared to managers and it seems that these individuals might even self-select an entrepreneurial career because of a personal preference for flexible thinking, less structure, and more responsibility (Stewart & Roth, 2001). Thus, a person's individual personality traits are one of two antecedents to the formation of risk perceptions.

A second antecedent to risk perception formation is trust. Consumers generally believe risk information that is provided by trusted sources but do not believe information that is provided by untrustworthy sources (Kuttschreuter, 2006). Higher levels of trust in an information sources leads to higher perceptions of perceived benefits, which then leads to more positive evaluations of a product (Knight, 2007). Consumers of genetically modified food can form different product opinions based on how the technology is framed, but these evaluations may vary based on the extent of the consumers' preexisting knowledge (Philips & Hallman, 2013).

Regardless of an individual's personality traits or trust, consumers also interpret risk on a case-by-case basis, depending on the situation and the context (Cox, Cox, & Mantel, 2010; Cox, Cox, & Zimet, 2006; Knight, 2007; Zepeda, Douthitt, & You, 2003). This context-dependent conceptualization of risk perceptions suggests that an individual may be much more likely to tolerate risk in relation to food choices than with extreme sports. Therefore, risk perceptions increase if there are no perceived benefits from consumption (Zepeda, Douthitt, & You, 2003).

Risk perceptions can have a huge impact on non-routine information seeking. Specifically, when consumers view the product as a set of gained benefits, they are more likely to seek out more information on the product and if consumers view the product as a set of losses, they are less likely to seek out additional information (Klerck & Sweeney, 2007; Kuttschreuter, 2006; Wilson, Evans, Leppard, & Syrette, 2004). This is perhaps because no additional information is needed for them to form an opinion. Greater amounts of unbiased scientific

information about technology-oriented products result in lower perceptions of risk (Klerck & Sweeney, 2007)

Risk perceptions also can have an impact on an individual's information processing behaviors. In one study of risk perceptions of a new drug, researchers found that the severity of the risk (chance of a slight headache vs. chance of permanent nerve damage to the brain) had a huge impact on product perceptions whereas risk frequency (very rare vs. very common) had zero impact on product perceptions (Cox, Cox, & Mantel, 2010). Greater perceptions of risk often lead to more risk avoidance efforts (Cox, Cox, & Zimet, 2006; Kuttschreuter, 2006). For some products, greater risk perceptions lead to a lower inclination to buy those products (Klerck & Sweeney, 2007; Zepeda, Douthitt, & You, 2003). In the case of GM products, this means consumers may avoid seeking additional information about the technology and avoid purchasing GM products.

Knowledge and Trust

Up until the late 1990s, the only barrier for GM crops was European consumer resistance (Santaniello, Evenson, and Zilberman, 2002). It was assumed that educational programs could overcome this temporary barrier by highlighting information about the benefits of GM crops (Marshall, 1998). However, this has changed as resistance has intensified and spread to other countries and labeling of GM food has become required in 64 countries (Center for Food Safety, 2016; Santaniello, Evenson, and Zilberman, 2002). Many consumers either know very little or at least perceive a lack of understanding of GM science (Costa-Font, Gil, & Traill, 2008; Curtis & Moeltner, 2007; Gaskell et al., 2000; Lusk et al., 2004; Steinhart, 2005). Additionally, scientific knowledge is generally positively correlated in with support for science, but not with support for specific technological applications (Allum et al., 2008; Moerbeek & Casimir, 2005). This general

correlation and a lack of public understanding, have led some authors to assert that public acceptance can be won by simply providing more information about genetic modification (Bonny, 2003). However, others have argued that while information flooding drives out indecision, it does not always lead to acceptance (Jelsøe, 1997). Some people may be more willing to take a stand once armed with scientific information, but it can also result in increased opposition (Madsen et al., 2003).

Millennial Consumers

Millennials, born approximately between 1985 and 1999, are a young consumer group and differ from previous generations as they are the first to be born into a world that highlights international interdependence and global engagement (Fry, 2015). Additionally, millennials tend to more value ethnic diversity, be more aware of ethical issues, and feel comfortable expressing themselves (Smith, 2011; Tapscott, 1998; Zemke et al., 2000). This unique generation has been vastly shaped by technological forces that have allowed rapid information exchange and networked communication (Gorman, Nelson, & Glassman, 2004; Howe & Strauss 2009). Millennials are also more socially, culturally, and environmentally conscious and value family, friends, communities, and self more than corporate entities (Hira, 2007; Sheahan, 2005).

Millennials also are unique in terms of their perspectives, motivations, decision-making rationales, and value drivers (Boyd, 2010; Kim et al., 2009; Weiss, 2003). They are roughly three times the size of Generation X and have high discretionary incomes, even though the majority are still continuing their education at higher institutions (Foscht et al., 2009; Palmer, 2008). In fact, their income is more than any other youth grouping in history (Morton, 2002). Millennials exceed all prior generational expenditures and have a large direct contribution to the economy (Jang et al., 2011; O'Donnell, 2006) that is further indirectly increased due to the fact that they

influence the majority of family purchase decisions (Morton, 2002; Taylor & Cosenza, 2002). Millennials have sufficient purchasing power to have a significant impact on current and future world economies and are accordingly the most powerful consumer group in the marketplace (Farris et al., 2002). This is because of their sheer size at approximately 1.8 billion people worldwide (United Nations, 2005) and because millennials are more consumption oriented than any other generation (Sullivan & Heitmeyer, 2008).

When it comes to certain food choices, millennials are less risk averse than older consumers and have lower recall awareness of risk information relative to older generations (Peake, Detre, Carlson, 2013; Teagle et al., 2010). Additionally, millennials consist of submarkets that are responsive to ethical purchasing to varying degrees (Bucic, Harris, & Arli, 2012). Yet, research also has suggested that ethical decisions are situational or issue-related and that ethically minded consumers may not consistently buy ethically (Bucic, Harris, & Arli, 2012; Carrigan & Attala, 2001; Singhapakdi et al., 1996). In fact, for millennials, some research has shown prominent purchase considerations to be traditional factors, such as price and quality (Carrigan & Attala, 2001). Millennials have been narrowly defined as a homogenous group by marketers, even though millennials have been shown to be diverse and comprised of distinctive consumer segments that likely require unique forms of marketing planning and communications (Geraci, 2004).

Attitudes and Values

Eagly and Chaiken (1995) defined an attitude as a psychological behavior, expressed by evaluating a particular person, organization, or object with some degree of favor or disfavor. These individual responses can be based upon feelings, cognitions, or past experiences. Additionally, individual attitudes are built upon individual values and beliefs (Eagly & Chaiken,

1995; Verplanken & Holland, 2002). An individual's attitude has been found to be the strongest predictor of behavioral intention, with some studies finding perceived control over behaviors and subjective norms as additional significant predictors of purchase intent of GM food. In the case of GM science, Honkanen and Verplanken (2004) found that attitude towards GM food was a strong predictor of consumer intention to purchase GM food. It also has been argued that, even though consumer experiences of GM products are limited, they still perceive GM food as extremely risky (Bredahl, 2001). Additionally, Bredahl (2001) posits that the specific attitudes towards GM food are likely to be based on the more general attitude of the individual, which in turn is embedded in values.

Rokeach (1973) defined values as "an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence along a continuum of relative importance." Values are ultimately important because of their possibility of having a central position in an individual's self-conception (Honkanen & Verplanken, 2004) and may guide behavior (Burgess, 1992; Schwartz, 1992). However, it also has been found that there is only a weak relationship between values and behavior (Feather, 1990). Other constructs have been introduced as mediators or moderators to explain this, including attitudes (Homer & Kahle, 1988; Stern, Kalof, Dietz, & Guagnano, 1995; Vaske & Donnelly, 1999), attitude strength (Holland, Verplanken, Smeets, & Van Knippenberg, 2001; Kraus, 1995; Krosnick & Abelson, 1992), attitude function (Maio & Olson, 1995), and the degree to which values are central to the self (Verplanken & Holland, 2002).

Sparks, Shepherd, and Frewer (1995) found that moral and ethical considerations have an influence on attitudes towards GM food. Additionally, Sparks, Shepherd, and Frewer (1995) and

Cook, Kerr, and Moore (2002) found environmental self-identity also to be a significant predictor of intentions. Some studies have found that the object of genetic modification is important, with many individuals feeling less negative towards genetic modification of plants and micro-organisms than genetic engineering of animals (Frewer, Howard, & Shepherd, 1997, Frewer, Coles, Houdebine, & Kleter, 2014).

When explaining divisions produced by political convictions, strongly held political views are typically based off of moral convictions (Janoff-Bulman, 2009; Lakoff, 2009; Skitka & Bauman, 2008). In addition, liberals and conservatives have been found to have different moral profiles, which leads to divergent moral attitudes and intuitions (Caprara, Schwartz, Capanna, Vecchione, & Barbaranelli, 2006; Graham, Haidt, & Nosek, 2009; Thorisdottir, Jost, Liviatin, & Shrout, 2007). Political attitudes grounded in morality are typically inflexible and resistant to change (Skitka & Morgan, 2009; Wright, Cullum, & Schwab, 2008) because an individual's moral convictions are usually experienced as factual and universally applicable (Skitka, Bauman, & Sargis, 2005). Much political rhetoric by both liberals and conservatives argue for why their political positions are morally correct (Lakoff, 2002). However, the effectiveness of conversion of opposing political rivals is questionable. Indeed, Feinberg and Willer (2015) found that political advocates used arguments composed of their own moral values in attempts to persuade those with rival political positions rather than utilize arguments composed of moral convictions of the targeted individuals.

Situational Theory of Publics

Categorizing people from one general public into smaller, homogenous public groups is commonly used in communication campaigns and is known as audience segmentation. Common beliefs, values, and attitudes are shared by these smaller publics (Slater, 1995), which allows

organizations to strategically communicate with them (Dibb, 1999). Targeted communication efforts can further encourage behavioral changes since different segments have specific motivators (Kotler, Roberto, & Lee, 2002), which is why the Situational Theory of Publics (STOP) (Grunig, 1983) is especially relevant to millennials who are often lumped together in marketing efforts, but have been found to be comprised of distinctive segments (Geraci, 2004).

According to STOP, an individual can react to messages through either information seeking or information processing. Information seeking is defined as the purposeful search for information (Aldoory, 2001, Grunig, 1997; Slater et al., 1992) and is granted higher priority than information processing because it "is what characterizes the active players in a public opinion issue" (Slater, Chipman, Auld, Keefe, & Kendall, 1992, p. 190). With information processing, members of a public discover or recognize a message (i.e., see a billboard while driving, read Facebook posts, or hear a message on the radio), but the message is not necessarily acted upon (Aldoory, 2001; Grunig, 1989; Slater et al., 1992).

Level of involvement, constraint recognition, and problem recognition are the three independent theory variables that influence the likelihood for information seeking and processing (Aldoory, Kim, & Tindall, 2010). The degree of personal connectedness or relevance to an issue is the individual's level of involvement. Any message regarding an issue will resonate, will be more salient, and will be processed at greater rates when said issue has high personal relevance in the individual's life (Aldoory, 2001; Grunig, 1997; Grunig & Hunt, 1984). Problem recognition refers to the extent to which people recognize an issue as a problem. Oftentimes people believe something should be done about a problem and will stop to think about it when they become aware of the problem (Grunig, 1997). The perceived or actual barriers that hinder people from doing something about a problem are known as constraint recognition.

STOP provides a solid framework for risk communication researchers to study responses to risk messages (Aldoory & Van Dyke, 2004) and has been found useful by several researchers. For example, Major (1993) found that for a landfill issue, problem-facing and constrained publics were more likely to conduct information-seeking behavior regardless of their level of involvement. Additionally, Roser and Thompson (1995) conducted research into how fear appeals can generate level of involvement and found that publics who were emotionally involved with a topic, responded more emotionally to new information. The researchers found that this emotional arousal formed active publics.

Publics were first defined by Dewey (1927) as groups of people faced with the same problem and working together to confront an issue. Grunig and Repper (1992) used that definition to differentiate between publics and stakeholders by stating that publics develop organically and actively seek information about an issue from an organization while stakeholders are chosen by organizations for marketing and communication efforts. However, it was proposed by Grunig (1983) that there is not one set public. Additionally, publics will actively, passively, or simply not communicate depending on the issue (Grunig, 2005). STOP has been elaborated with this thought process to explore why there are both passive and active publics. Grunig (1983) found that identifying differences in types of publics could aid in the development of appropriate communication methods for different situations.

There are four different types of publics identified by Grunig (1983): nonpublics, latent publics, aware publics, and active publics. Nonpublics have no exposure to the specific issue or problem, while latent publics are exposed to the issue but do not recognize it as an issue. Aware publics recognize that there is an issue or problem but do not take action, while active publics recognize the issue or problem and take action in response to the issue or problem. An

individual's level of issue involvement, problem recognition, and constraint recognition are what determine the specific public an individual is categorized into (Grunig, 1983). Issue involvement is how personally connected people are to a problem, while problem recognition requires a person to be aware of a problem or issue that is affecting them. Constraint recognition is an individuals' perception of their ability or lack of ability to do something about the problem or issue. Individuals who are high in issue involvement and issue recognition but low in constraint recognition for an issue or problem are categorized as active publics. Conversely, those who perceive high constraint recognition and low problem recognition and issue involvement are considered non-publics (Rawlins, 2006).

Different communication strategies should be implemented for different publics (Rawlins, 2006). Communication should be behavior-oriented and include a call to action for active publics. Active publics will likely take action, such as providing endorsements, making donations, or letter writing and are considered to be advocate stakeholders. Dormant stakeholders are the part of the aware public that are not quite ready to become involved in an issue. Sometimes the inactivity of dormant stakeholders is due to a lack of knowledge or a lack of personal connection with the issue. Communication strategies for this public should focus on increasing personal relevance and/or knowledge. Finally, apathetic stakeholders are simply not aware that an issue exists and fit into the latent public category. Communication efforts with this segment should focus on increasing the saliency of the issue and inviting members to become more involved in addressing the issue (Rawlins, 2006).

Hallahan (2000) expanded on STOP by exploring the role of inactive publics in public relations strategies, arguing that they are most often overlooked or forgotten. Specifically, Hallahan (2000) explored how issues involvement and knowledge predict consumers' responses

to communication. He found that active publics have high issue involvement, high knowledge levels, try to influence change, and tend to initiate conversations with organizations about issues (Hallahan, 2000). Communication strategies with active publics should address leaders of the public segment and encourage open dialogue. Aware publics have low involvement, high knowledge, and subsequently are unlikely to communicate about the issue or problem unless they would personally benefit from the communication. Aware publics can have influence in their communities and their behavior should be monitored. Depending on the issue, communication with aware publics should encourage or discourage them to act as influencers and actively supply them with more information on the issue or problem (Hallahan, 2000).

Table 2.1
Hallahan's Categorization of Publics

	Low Involvement	High Involvement
High Knowledge	Aware Public	Active Public
Low Knowledge	Inactive Public	Aroused Public

Hallahan (2000) split the latent public identified by Grunig (1983) into inactive and aroused publics. The aroused public was characterized by moderate/high issue involvement and low knowledge. This group has some familiarity with the issue or problem and will seek information to reduce their risk perceptions. Hallahan (2000) recommended communication researchers examine the source of this group's arousal and communication strategies should frame messages related to the public's concern of the issue.

People labeled as inactive public were characterized with low knowledge and low issue involvement. Outside their own personal needs or without being prompted, inactive publics are unlikely to seek information on an issue (Hallahan, 2000). Therefore, proactive communication strategies focused on providing information work best for this public. Organizations also can

build positive relationships with inactive publics by motivating this public to learn more about an issue and increasing their knowledge of the topic. Organizations have to actively investigate ways to facilitate communication opportunities with inactive publics and enhance this publics motivation to process the information (Hallahan, 2000).

Major (1998) used STOP to determine how to effectively communicate with publics after a natural disaster. People feel more connected to a problem and have higher problem recognition when engaged in interpersonal discussion related to the problem (Major, 1998). Additionally, social networking platforms can increase interpersonal communication when developing community response plans to natural disasters, rather than using traditional outlets like newspapers and television to convey information (Major, 1998). In order to facilitate increased problem recognition, messages should include specific risks related to the community (Major, 1998). When publics had a level of emotional involvement in an issue, fear appeals in messages caused said publics to respond emotionally (Roser & Thompson, 1995). Additionally, it was found that emotional arousal drove publics to become active (Roser & Thompson, 1995).

Aldoory, Kim, and Tindall (2010) also used this theory to examine how shared risk experiences influence risk communication. Issue involvement increases when viewers identified similarities between themselves and the victims or spokesperson of food terrorism in a news story. Heighten awareness of an issue can be induced by the media, which can increase consumer behaviors to protect themselves against potential risks. In this situation, researchers recommended using sources in media coverage that share similarities with the audience (Aldoory et al., 2010).

Risk Information Seeking and Processing Model

People can be influenced by the information seeking and processing strategies applied to

information they encounter in mass media or elsewhere (Eagly & Chaiken, 1993; McGuire, 1974; Petty & Cacioppo, 1986). For example, more active information seeking is more likely to lead to effortful systematic processing of acquired information than routine and habitual information seeking (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006). Additionally, when information is processed more systematically, individuals tend to develop more stable attitudes toward a given topic and are more resistant to changing that attitude when compared to more superficial processors (Eagly & Chaiken, 1993; Eagly & Kulesa, 1997). Therefore, when attempting to sway population segments, it behooves communicators to trigger non-routine information seeking and analytical information processing.

However, risk communication scholars often omit information seeking and processing strategies from their research models, instead using exposure to risk information as an independent variable and as a potential predictor of what individuals know or feel about risk or what they will do about a risk (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006). This approach fails to account for variability in information needs and information processing capabilities (Vaughan & Seifert 1992). From a receiver-oriented standpoint, an assumption is that individuals will seek and process information when they perceive information to be relevant and useful (Galotti, 1989; Voss, Perkins, & Segal 1991; Wynne, 1992). The Risk Information Seeking and Processing (RISP) model developed by Griffin, Dunwoody, and Neuwirth (1999) draws upon existing theoretical concepts from several different research disciplines to build a more complex representation of the role of risk communication in potential behavioral change. The construction of the model draws most heavily upon the model of heuristic-systematic (HSM) processing developed by Chaiken (1980) and integrates Chaiken's concepts of heuristic and systematic processing. Additionally, two of the more notable concepts of the model are information

subjective norms and information insufficiency. In other words, the perceived social pressure to be informed and the perceived gap in knowledge held and knowledge needed to make a decision.

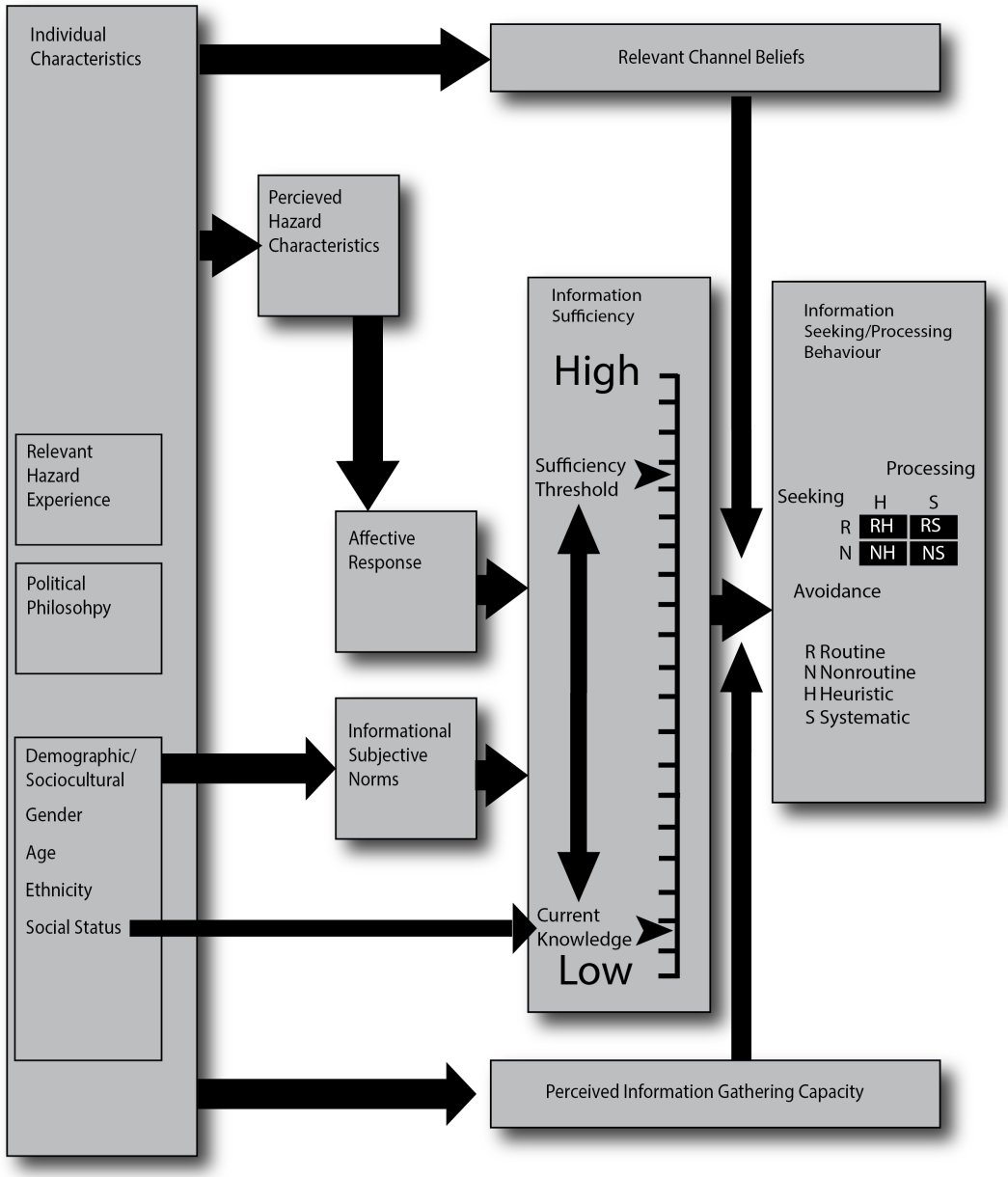

Figure 2.1
Griffin Dunwoody, and Neuwirth's (1999) Risk Information Seeking and Processing Model

Griffin, Dunwoody, and Neuwirth's (1999) RISP (Figure 2.1) model explores the factors that predict differential use of two information processing strategies and two information seeking strategies. Additionally, the model looks at information seeking and processing as dependent

rather than independent factors that prompt more or less effortful analytical work in individuals faced with a risk (Cho, Reimer, & McComas, 2015). The model posits that there are characteristics of individuals that predispose them to seek and process information in different ways. There are eight factors of the model: 1) individual characteristics, 2) perceived hazard characteristics, 3) affective response to the risk, 4) felt social pressures to possess relevant information, 5) information sufficiency, 6) one's capacity to learn, 7) beliefs about the usefulness of information in various channels and 8) information seeking and processing strategies. The first seven influence the eighth factor, information seeking and processing, whether a person will seek out risk information in either routine or non-routine ways and process the information heuristically or analytically (Cho, Reimer, & McComas, 2015; Griffin, Dunwoody, & Neuwirth, 1999). Additionally, information sufficiency, perceived information gathering capacity, and relevant channel beliefs will influence the extent to which an individual will seek risk information routinely or non-routinely and process risk information systematically or heuristically (Griffin, Dunwoody, & Neuwirth, 1999).

The HSM model describes a dual form of human processing of information, one more superficial (which people tend to use unless motivated to do otherwise) and the other a deeper, more effortful and analytical processing. Essentially, people tend to adopt the form of processing for a given message based on their capacity to processes the information in each manner and their motivation to engage in systematic processing, which can occur simultaneously with heuristic processing (Eagly & Chaiken, 1993). According to HSM, systematic processing is motivated by a person's desire for information sufficiency. Eagly and Chaiken (1993) states the sufficiency principle "asserts that people will exert whatever effort is required to attain a 'sufficient' degree of confidence that they have accomplished their processing goals" (pg. 330).

Heuristic and systematic processing routes are influenced by whether processing goals are set low or high and the corresponding level of confidence that the individual has sufficient information. Eagly and Chaiken (1993) defined heuristic processing as "a limited mode of information processing that requires less cognitive effort and fewer cognitive resources" (p. 327) than systematic processing. Most individuals utilize heuristic processing of messages because it requires the least amount of effort, evaluating validity and decision making through the use of superficial cues such as length of the message, trusted spokesperson, feelings, and general statistical data (Griffin, Neuwirth, Giese, & Dunwoody, 2002). Conversely, systematic processing involves a more comprehensive effort to analyze and make sense of information where the individual undertakes a more careful and extensive evaluation of information. Naturally, attitudes formed utilizing systematic processing tend to be more permanent and attitudes formed utilizing heuristic processing tend to be more volatile. Both types of processing can occur simultaneously until individuals reach a level of processing sufficiency (Eagly & Chaiken, 1993).

The RISP model proposes that information sufficiency, the gap between what an individual currently knows and what that individual believes they need to know about a risk, is a motivating factor to move beyond heuristic processing to systematic processing of information about the hazard and the behavior related to it. For example, critically evaluating the message, thinking about the message, and integrating message-based information centered around current knowledge. However, systematic processing depends on the individual's ability to think comparatively and critically, the individual's existing knowledge structures, the perceived ability to obtain relevant information (Eagly & Chaiken, 1993), and the perceived usefulness and credibility of available information (Griffin, Neuwirth, Giese, & Dunwoody, 2002). Previous

research utilizing the RISP model have found that information sufficiency is related to emotional response to the risk and perceived normative pressures (Griffin, Neuwirth, & Dunwoody, 1998) as well as an influence of the information seeking or avoidance and heuristic or systematic processing of risk information (Griffin, Dunwoody, Neuwirth, & Giese, 1999; Trumbo, 1999, Trumbo 2002).

Additionally, the RISP model also heavily incorporates Ajzen's Theory of Planned Behavior (TPB) (Ajzen, 2007; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) to help understand how communication behaviors might affect an individual's risk behaviors (e.g., adoption and maintenance of preventative behaviors). Additionally, two of the more notable concepts of the model are informational subjective norms and information insufficiency. In other words, the perceived social pressure to be informed and the perceived gap in knowledge held and knowledge needed to make a decision.

TPB has been thoroughly tested across a wide range of responses to health risks of various kinds (Boyd & Wandersman, 1991; Fishbein & Middlestadt, 1989; Griffin, Neuwirth, & Dunwoody, 1995; Henning & Knowles, 1990; Knuth, Connelly, & Shapiro, 1993; Montano & Taplin, 1991; Stasson & Fishbein, 1990). The TPB suggests that behavioral intention and perceived behavioral control are predictors of a given behavior. Also, perceived behavioral control, attitude toward the behavior, and subjective norms predict behavioral intention. Prior attitude toward the behavior is cognitive structure, an indirect or belief-based attitude and a variable that is composed of salient behavioral beliefs, typically about the outcome of performing a specific behavior, and an evaluation of each belief outcome (Ajzen, 1991; Fishbein & Ajzen, 1975).

Individual Characteristics

Examining the first factor of the RISP model created by Griffin, Dunwoody, and Neuwirth (1999), individual characteristics, is comprised of a set of variables representing their experiences with the hazard and demographic and sociocultural characteristics of individuals, including gender, ethnicity, age, socioeconomic status, and political philosophy. Gender has traditionally been a systematic predictor of variance. Ethnicity has similarly been found to be related to risk perception because of differences in 1) perceptions of personal control and/or 2) other factors such as differences in level of exposure to risks (Vaughn & Nordenstam, 1991).

The demographic and sociocultural variables help absorb variance in the dependent variable of interest. Age has been found to typically have a positive relationship with risk perception, meaning the older one is the more fearful on is. However, this may be risk-specific as research also has shown concern of long-term risk may decrease with age (Fischer et al., 1991; Griffin et al., 1994). One of the major dimensions of socioeconomic status, education, tends to be an important predictor of an individual's ability to seek, process, and retain information and consequently can create knowledge gaps between higher and lower socioeconomic segments of society (Griffin, 1990; Olien, Donohue, & Tichenor, 1983). Additionally, minorities and the poor have been found to be more likely to be exposed to environmental health risks than the wealthy and white people (Bullard, 2000; Lopez, 2002; Mohai & Bryant, 1992). Different income and education levels, experiences, and risk exposure levels can affect perceptions related to uncertainty, such as how much people think they know, how effective they feel, and their levels of anger and worry about risks (Arcury et al., 2002; Lindbladh & Lyttkens, 2003). Additionally, people in different geographical locations often have differing knowledge of environmental risks based in part on different experiences (Harding, 1998; Irwin & Wynne, 2003).

Grunig (1983) observed that people typically apply a cognition from past situations that can serve as an initial guide when deciding how to think, act, or communicate in a new situation. Additionally, he observed that individuals only develop new criteria, if past cognition guides fail in a new situation. Johnson and Tversky (1983) also found that experience with one risk can transfer to an individuals' response to other risks. Additionally, research has shown that a personally relevant issue is more likely to generate systematic processing efforts than an issue relegated to lower levels of importance or relevance (Donohew, 1990; Petty & Cacoppo, 1981; Eagly & Chaiken, 1993).

Perceived Hazard Characteristics

Risk perception researchers (Gregory & Mendelsohn, 1993; Slovic, 1992) have argued that risk perceptions are multidimensional and take into account more than just estimates of likelihood of harm. Personal control is a self-evaluation of the amount of control an individual has over harm from hazards (Ajzen & Timko,1986; Rogers, 1985; Schwarzer, 1992; Weinstein, 1993). This is important because lower levels of perceived control are associated with greater risk perceptions (Morrison, Ager, & Willock, 1999). Additionally, trust plays a major role in the development of risk perceptions (Earle & Cvetkovich, I994; Flynn, Burns, Mertz, & Slovic. 1992; Kasperson et al., 1986; MacGregor et al., 1994; Slovic, 1992; Wynne, 1992). There are 9 variables identified by Griffin, Dunwoody, and Neuwirth (1999) that account for variance in assessment of perceived risk and dread. These include 1) an estimate of the number of deaths that would take place; 2) a judgment of the potential for a catastrophic outcome; 3) an assessment of the immediacy of the effect; 4) an assessment of the economic benefits of the risk; 5) an assessment of the pleasure benefits of the risk; 6) the estimated impact of the risk on future generations; 7) personal control; 8) trust in risk management; and 9) perceived threats to personal

values.

Affective Response

A growing body of research has shown a link between emotional actions and moods and both heuristic and systematic processing (Griffin, Neuwirth, Dunwoody, & Giese, 2004). Of particular interest is the finding that positive emotions are associated with heuristic information processing whereas negative states are correlated with systematic processing (Batra & Stayman. 1990; Bohner & Apostolidou, 1994; Bohner, Chaiken, & Hundyadi, 1994; Kuykendall & Keating, 1990). However, extreme negative affect, such as fear, can elicit greater heuristic processing or even avoidance (Jepson & Chaiken, 1990). Macleod, Williams, and Bekerian (1991), found that individuals who worry about future events or face uncertainty often have negative expectations and feel anxiety. According to Mathews (1990), worry is based in the cognitive processes of anxiety, the same processes that keep a person alert and can affect an individual's attention span.

Informational Subjective Norms

A person's perceptions of other people's expectations to perform a particular behavior can be an important predictor of behavior (Ajzen & Fishbein, 1980; Fishbein and Ajzen, 1975) and a person's sense of control or capacity in performing that behavior (Ajzen, 2007). According to the TPB (Ajzen, 1991; Ajzen, 2002; Ajzen, 2007), a behavior is guided by it consequences, the actions of others, and individual control of behavior performance. Science frequently provides ambiguous information concerning changes to environmental or health behavior (Bratt 1999). Therefore, subjective norms are important predictors of engaging in behaviors. Little research has been done, that looks specifically at informational subjective norms defined by Griffin, Dunwoody, and Neuwirth (1999) as perceptions that others believe that we should be or

should become informed about a specific topic. In other words, Griffin, Dunwody, and Neuwirth (1999) propose informational subjective norms as perceived social normative influences that motivate an individual's desire for information sufficiency. More recently, it has been suggested that informational subjective norms play a more direct role on information seeking behavior, independent of information insufficiency (Griffin et al., 2008).

Information Sufficiency

Eagly and Chaiken (1993) have proposed that "people will exert whatever effort is required to attain a 'sufficient' degree of confidence that they have accomplished their processing goals" (p. 330). Additionally, personal relevance can motivate an individual to process information more systematically (Eagly & Chaiken, 1993). Bohner et al. (1998) found that systematic processing increased as the discrepancy between desired and actual judgmental confidence grew. The basic concept of the information sufficiency measure is that it is the amount of information needed by an individual to deal adequately with a given risk (Griffin, Dunwody, and Neuwirth, 1999). Information insufficiency is defined as the gap between what people know about a given risk (current knowledge) and what they need to know for their own purposes (sufficiency threshold).

Perceived need is a key motivator for more effortful information processing and is driven by an individual's desire to have more confidence in his or her judgments about the information presented to them (Chaiken, Liberman, & Eagly, 1989; Maheswaran & Chaiken, 1991). Individual's must process information selectively and determine how much energy to devote to processing different messages through a mechanism called the sufficiency principle where the individual strikes a balance between effort allocated and their desired level of judgmental confidence for each message (Chaiken, Liberman, Eagly, 1989; Kahlor, Dunwoody, Griffin,

Neuwirth, 2006). The principle states that an individual will engage in processing until he or she has reached a predetermined depth or breath of understanding (Chaiken, Liberman, & Eagly, 1989; Eagly & Chaiken. 1993; Jain & Maheswaran, 2000; Maheswaran & & Chaiken; 1991).

The perception of a large gap in someone's knowledge of a risk and level of understanding needed to attain their processing goals is more correlated to more systematic processing (Chaiken, Liberman, & Eagly, 1989; Eagly & Chaiken. 1993; Jain & Maheswaran, 2000; Maheswaran & Chaiken; 1991). Gap size is also correlated to seeking additional information through multiples sources, regardless of processing style (Eagly & Chaiken, 1993). Griffin et al. adapted the sufficiency principle for the risk information seeking and processing model and focused on information sufficiency, also known as information insufficiency (Griffin, Dunwoody, & Neuwirth, 1999). Additionally, the amount of current knowledge about a risk could affect their capacity to gain new information (Griffin et al., 2008; Kahlor et al., 2006). The model also states that informational subjective norms and affective response will affect information sufficiency (Griffin, Dunwoody, & Neuwirth, 1999).

Relevant Channel Beliefs

Relevant channel beliefs are an individual's perceptions of information sources, such as the media, and can affect an individual's information seeking behaviors employed to provide the individual with information about the risk (Griffin, Dunwoody, & Neuwirth, 1999; Kahlor, 2006). This includes their perceptions of trustworthiness and usefulness (Griffin, Dunwoody, & Neuwirth, 1999). The RISP model (Griffin, Dunwoody, & Neuwrith, 1999) suggests that information sufficiency, perceived information gathering capacity, and relevant channel beliefs interact to with one another to affect information seeking and processing behaviors. It has been observed that people have various images of the media and that these images affect the

information processing strategies employed by individuals (Kosicki & McLeod, 1990). For example, individuals seem to more systematically process information from the media when they believe the news to be of poor quality, believe the media to be too powerful, and have negative feelings towards the content of the media (Kosicki & McLeod, 1990). In the age of social media, it has been found that uncertainties can be offset by online-self disclosure and information seeking (Lin, Zhang, Song, & Omori, 2016).

Additionally, trust in social-media based information is a significant predictor of behavioral engagement (Lin, Zhang, Song, & Omori, 2016). Research has shown that millennials utilize Google and human sources as the first sources they use for quick searches (Connaway, Radford, Dickey, Williams, & Confer, 2008). Younger millennials also tend to most frequently consult their parents, while older millennials tend to most frequently consult friends (Connaway, Radford, Dickey, Williams, & Confer, 2008). Additionally, millennials have tended to increasingly rely on social media as a media source (Gangadharbatla, Bright, & Logan, 2014).

Information Gathering Capacity

One's self-efficacy (Bandura, 1982) or one's perceived behavioral control (Ajzen, 2007) in performing communication behaviors is important to measure. This variable captures Eagly and Chaiken's (1993) notion of capacity as one of the precursors of information seeking and processing. The RISP model refers to "perceived information gathering capacity" as a manifestation of self-efficacy or perceived behavioral control (Griffin et al., 2008).

Information Seeking and Processing

The RISP model adapts heuristic and systematic information processing from the Heuristic Systems model formulation and combines them with routine or nonroutine risk information seeking (Griffin, Dunwoody, & Neuwirth, 1999).

Eagly and Chaiken (1993) defined heuristic processing as a limited form of processing, requiring less cognitive effort and fewer resources that systematic processing. The latter being a much more comprehensive effort to analyze and understand new information. Griffin, Dunwoody, and Neuwirth (1999) proposed that information insufficiency is the main motivator for a person to devote more energy towards processing a message. However, the more effortful systematic processing is dependent on the individual's capacity to think comparatively and critically, the individual's existing knowledge structures, the perceived usefulness of the information, and the credibility of the information. Systematic processing is also affected by the variables of perceived information gathering capacity and relevant channel beliefs. However, most people employ the least effort in processing messages, judging their validity, and making decisions through superficial cues such as length of message, trustworthiness of spokesperson, or use of statistical data by default. This default is otherwise known as heuristic processing. However, both forms can occur simultaneously (Eagly & Chaiken, 1993).

In terms of information seeking, it is best to conceptualize in terms of level of intensity (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006). People can seek using a lot or very little effort. McGuire (1974) proposes that information seeking is dichotomous with two levels of intensity: active and passive.

Active seeking is more goal-driven, whereas passive seeking is a more ritual-base behavior. Active seeking goes beyond routine media use and is driven by motivating factors such as desire for autonomy, tension reduction, or self-expression. For example, Internet searches or utilizing the library. In contrast, passive seeking is characterized as routine or habitual and is motivated by factors such as identity building, identity reinforcement, and modeling. For example, scrolling through Facebook and stumbling across and article or scanning a newspaper.

What distinguishes active from passive seeking are the strength of the motivating factors and perceived accessibility of information channels that assist individuals in meeting information needs. Routine is also categorized as passive and nonroutine is categorized as active information seeking.

Therefore, there are four categorical mixtures of risk information seeking and processing variables:

- Routine/Heuristic (RH)- Most common, in which individuals superficially attend to risk messages they encounter through habitual media use.
- Routine/Systematic (RS)- Individuals do not alter their information gathering habits, but do process more deeply and critically evaluate information they encounter through ritual media use.
- Nonroutine/Heuristic (NH)- individuals expand extra effort to seek out information outside of normal channels, but process information superficially.
- Nonroutine/Systematic (NS)- The least common in which individuals expand extra energy to search information and process information critically.

Information is pursued and processed until perceived knowledge reaches the sufficiency threshold. Information gathering capacity can either facilitate or stifle this process. Specifically, the act of information seeking and processing 1) would be expected to typically raise the level of perceived knowledge and 2) can affect some of the other variables in the model, especially perceived hazard characteristics (Griffin, Dunwoody, & Neuwirth, 1999). Additionally, attitudes formed during more systematic processing are more stable and longer lasting than heuristic processing (Eagly & Chaiken, 1993; Eagly & Kulesa, 1997). Therefore, understanding the factors that influence systematic processing can help communicators garner support for

controversial technologies like genetically modified food.

Summary of Literature

The scientific consensus is that genetically modified has not proven to be harmful to humans or animals (Chassy, 2002; Connor, Glare, & Nap, 2003; Delaney, 2015; Flachowsky, Chesson, & Aulrich, 2005). Additionally, farmers have rapidly adopted genetically modified crops faster than any other technology in history (Fernandez-Cornejo & Casswell, 2006; Lucht, 2015) and have cited a multitude of financial and non-financial benefits (Brookes & Barfott, 2014; Carpenter, 2013; Fernandez-Cornejo, Wechsler, Livingston, and Mitchell, 2014; Klümper & Qaim, 2014; Qaim, 2014). However, consumers perceive a risk to either themselves or the environment (Santaniello, Evenson, & Zilberman, 2002).

Risk perception research has identified individual tolerance, or lack of, (Goldstein, Johnson, and Sharpe, 2008) and trust (Knight, 2007; Kuttschreuter, 2006) to be influential in risk perception formation. Additionally, how information about the technology is framed can influence consumer opinions, but can vary based on the individual's pre-existing knowledge (Philips & Hallman, 2013). Additionally, risk perceptions can increase if there are no immediate benefits (Zepeda, Douthitt, & You, 2003), as is the case with genetically modified food whose benefits have been geared towards farmers rather than consumers (Falk et al., 2016; Fernandez-Cornejo & Casswell, 2006; USDA, 2016).

Risk perceptions can impact information seeking behaviors by increasing or decreasing information seeking behavior (Klerk & Sweeney, 2007; Kuttschreuter, 2006; Wilson, Evans, Leppard, & Syrette, 2004). Additionally, it can affect information processing behaviors (Cox, Cox, & Mantel, 2010). Greater risk perceptions often lead to more risk avoidance efforts (Cox, Cox, & Zimet, 2006; Kuttschreuter, 2006) and a lower inclination to buy those products (Klerk

& Sweeney, 2007; Zepeda, Douthitt, & You, 2003).

Additionally, greater amounts of scientific information can result in lower perceptions of risk (Klerck & Sweeney, 2007). However, while information flooding may drive out indecision, it doesn't always lead to acceptance (Jelsoe, 1997) and can also result in increased opposition (Madsen et al., 2003). Therefore, persuading individuals to accept and support genetically modified food is much more complicated than a lack of knowledge.

Millennials are a young consumer group who have different beliefs and opinions from other generations (Smith, 2011; Tapscott, 1998: Zemke et al., 2000). They're more socially, culturally, and environmentally conscious (Hira, 2007; Sheahan, 2005) and are unique in terms of perspectives, decision-making rationales, and drivers. Additionally, they are an extremely large group at 1.8 billion people worldwide (United Nations, 2005), are more consumption oriented than any other generation (Sullivan & Heitmeyer, 2008), and consequently have sufficient purchasing power to significantly impact current and future economies through their purchasing and spending behaviors (Farris et al., 2002). This group has often been described as homogenous by marketers when in fact they are a diverse group comprised of many distinctive consumer segments requiring unique marketing and communication efforts (Geraci, 2004).

Audience segmentation is common in communication campaigns where common beliefs, values, and attitudes are shared by these smaller groups (Slater, 1995), allowing for strategic communication efforts (Dibb, 1999). Targeted communication efforts can encourage behavioral change (Kotler, Roberto, & Lee, 2002), which is why the Situational Theory of Publics (STOP) (Grunig, 1983) is especially relevant to millennials. Level of involvement, constraint recognition, and problem recognition are the three independent variables that influence the likelihood for information seeking and processing (Aldoory, Kim, & Tindall, 2010). Dewey (1927) first

defined the term Publics, as groups of people who faced the same problem and were working together to solve that problem. Grunig and Repper (1992) used that differentiate between publics and stakeholders. Publics develop organically and actively seek out information about an issue from an organization while stakeholders are chosen for marketing and communication efforts (Grunig & Repper, 1992).

There are four different types of publics identified by Grunig (1983): nonpublics, latent publics, aware publics, and active publics. Nonpublics have no exposure to the specific issue or problem, while latent publics are exposed to the issue but do not recognize it as an issue. Aware publics recognize that there is an issue or problem but do not take action, while active publics recognize the issue or problem and take action in response to the issue or problem. An individual's level of issue involvement, problem recognition, and constraint recognition are what determine the specific public an individual is categorized into (Grunig, 1983). Hallahan (2000) later split the latent public identified by Grunig (1983) into active and arouse publics. The aroused publics are characterized by a moderate or high level of issue involvement but low knowledge. While inactive publics are characterized as having low knowledge and low issue involvement.

The Risk Information Seeking and Processing Model (RISP) also takes into account, the risk information seeking and processing behaviors of individuals. People can be influenced by the information seeking and processing behaviors applied to information they encounter (Eagly & Chaiken, 1993; McGuire, 1974; Petty & Cacioppo, 1986). For example, active information seeking is more likely to lead to more effortful systematic processing (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006) which in turn is more likely to lead to more stable attitudes and a greater resistance to change (Eagly & Chaiken, 1993; Eagly & Kulesa, 1997). However, it is

often omitted from research models with researchers instead opting to use exposure to risk information as a predictor of what individuals know or feel about risks and their subsequent behaviors (Kahlor, Dunwoody. The RISP model draws upon the Heuristic-Systematic Processing Model (HSM) (Chaiken, 1980) and the Theory of Planned Behavior (Ajzen, 2007; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975).

The RISP model explores the factors that predict differential use of systematic and heuristic processing and active information seeking and information avoidance (Griffin, Dunwoody, & Neuwirth, 1999). Additionally, it looks at seeking and processing as dependent rather than independent factors that more or less prompt effortful analytical work in individuals faced with a risk (Cho, Reimer, & McComas, 2015). There are eight factors of the model: 1) individual characteristics, 2) perceived hazard characteristics, 3) affective response to the risk, 4) felt social pressures to possess relevant information, 5) information sufficiency, 6) one's capacity to learn, 7) beliefs about the usefulness of information in various channels and 8) information seeking and processing strategies. The first seven influence the eighth factor, information seeking and processing, whether a person will seek out risk information in either routine or non-routine ways and process the information heuristically or analytically (Cho, Reimer, & McComas, 2015; Griffin, Dunwoody, & Neuwirth, 1999). Additionally, information sufficiency, perceived information gathering capacity, and relevant channel beliefs will influence the extent to which an individual will seek risk information routinely or non-routinely and process risk information systematically or heuristically (Griffin, Dunwoody, & Neuwirth, 1999).

Chapter 3 - Methods

While there has been extensive research completed on adoption of genetic modification science (Dillen, Demont, Tillie, & Rodriguez, 2013; Fernandez-Cornejo & Casswell, 2006; Gonsalves, Ferriera, Manshardt, Fitch, & Slightom, 2000; Gonsalves C.V. & Gonsalves D., 2014; James, 2014; Lucht, 2015) and its risk to human health and the environment (Funk & Rainie, 2015; Nicolia, Manzo, Veronesi, & Rosellini, 2014; USDA, 2015; Vain, 2007; Van Eenennaam & Young, 2014), little has been done to understand the ways in which millennial consumers are seeking out and processing information about GM science. Millennial groups have been identified as having a large portion of purchasing power and political influence (Farris et al., 2002 Jang et al., 2011; O'Donnell, 2006). Yet, millennials are often treated as a homogenous group by marketers when, in reality, the group has many differing sub-segments (Geraci, 2004). Additionally, the Situational Theory of Publics fails to account for whether publics are supportive or non-supportive of the technology or the application. Therefore, the purpose of this study was to identify Supportive and Non-supportive millennial publics and the factors that determine how these millennial publics seek and process risk information about genetically modified food. This study focused on examining relevant channel beliefs, perceived knowledge gaps, and perceived information gathering capacity of millennial publics. This study also went one step further than the Situational Theory of Public by differentiating between Supportive and Non-supportive publics.

Guided by the Risk Information Seeking and Processing model and the Situational Theory of Publics, the research objectives for this study were:

RO 1: Identify the individual characteristics of Supportive and Non-supportive millennial publics of genetically modified food.

RO 2: Examine relevant channel beliefs of Supportive and Non-supportive millennial publics of genetically modified food.

RO 3: Identify and describe the information gap of Supportive and Non-supportive millennial publics of genetically modified food.

RO 4: Define the perceived information gathering capacity of Supportive and Non-supportive millennial publics of genetically modified food.

RO 5: Characterize the information seeking and processing behavior of Supportive and Non-supportive millennial publics of genetically modified food.

Instrumentation

When the researcher primarily uses post-positivist claims for developing knowledge, utilizes methods of inquiry, and collects data on a predetermined instrument that yields statistical data, quantitative methods are used (Creswell, 2007). Surveys can be useful in gathering large amounts of data from populations that are unfeasible to reach through focus groups or interviews (Dillman, Smyth, & Christian, 2014). Internet surveys are a type of quantitative research method and offer several advantages, such as elimination of paper, postage, data entry costs, time required for survey implementation, and reducing the cost per correspondence in sample sizes (Dillman, Smyth, & Christian, 2014). Web survey procedures suggested by Dillman, Smyth, and Christian (2014) were implemented and followed to the best of the researcher's ability, such as keeping online survey design simple to increase compatibility with a number of web browsers and variable speed of Internet providers (Dillman, Smyth, & Christian, 2014). Respondents were paid for their completion of the survey as recommended by Dillman, Smyth, and Christian (2014).

Variables and constructs for individual characteristics, perceived hazard characteristics,

affective response, informational subjective norms, information sufficiency, relevant channel beliefs, information gathering capacity, information seeking, and information processing were adapted from Griffin, Dunwoody, and Neuwirth's Great Lakes Study (Griffin, Dunwoody, & Neuwirth, 1999; Griffin, Neuwirth, Dunwoody, & Giese, 2004; Griffin, Neuwirth, Giese, & Dunwoody, 2002; Kahlor, Dunwoody, Griffin, Neuwirth, 2006; Kahlor, Dunwoody, Griffin, Neuwirth, & Giese, 2003; Powell, Dunwoody, Griffin, & Neuwirth, 2007). Hallahan's (2000) categorization of publics was used for this study (Table 3.1). Respondents were catagorized as being supportive or non-supportive, as having high or low issue involvement and knowledge, and coded as belonging in the Active, Aware, Aroused, or Inactive public categories for a total of eight distinct public groups (Figure 3.1). The constructs measuring issue involvement, knowledge, and level of support were adapted from Ruth, Lamm, and Rumble (2017).

Table 3.1
Hallahan's Categorization of Publics

	Low Involvement	High Involvement
High Knowledge	Aware Public	Active Public
Low Knowledge	Inactive Public	Aroused Public

The survey consisted of 47 items (Appendix A). Survey questions were reviewed by a panel of experts for face and content validity. The panel of experts included one associate professor in agricultural communications, one department head in agricultural communications, and one associate professor in biology. Following the review of the instrument by the panel of experts, the five knowledge questions were clarified and reworded. Additionally, terminology was updated within the survey to be consistent with the term genetically modified food or genetic modification instead of biotechnology and similar terms. To improve reliability of the survey, Cronbach's alpha was used to analyze the data set for internal consistency of items

(Tavakol & Dennick, 2011).

Reverse coding was used to identify issues with respondents randomly selecting answers. Incomplete surveys and surveys where respondents randomly guessed answers were discarded. Additionally, the survey was tested with millennial-age graduate students to identify any issues with the instrument. Following the pilot test, demographic questions were moved to the front of the survey since responses were secured through Qualtrics and respondent hesitation to answer demographic questions was less of an issue. For two sliding scales asking respondents to rate their currrent level of knowledge of the risks of genetically modified food and the level they think they need to make an informed decision from 1 to 100, researchers changed the number of labels from every 5 points to every 10 points due to issues with mobile devices. After testing the survey, it was soft launched to identify any additional issues and collection was stopped at 8% (n = 40). After checking the survey one final time for flaws and finding none, collection resumed without changes to the survey.

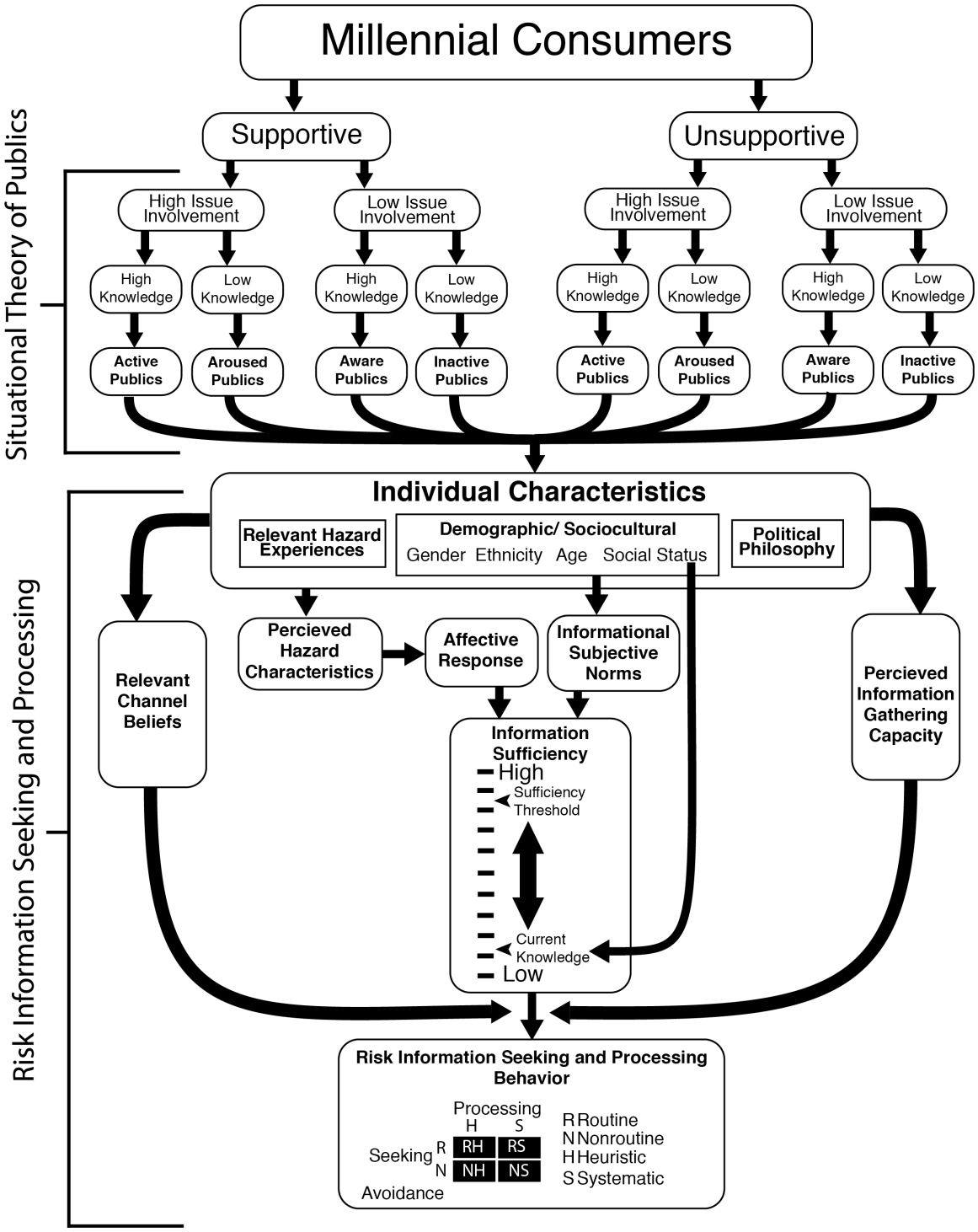

Figure 3.1

Proposed Public Risk Information Seeking and Processing Model

Respondents were sorted into one of eight public groups based on level of support, level of issue involvement, and level of knowledge: Non-supportive Inactive, Non-supportive Aware, Non-supportive Aroused, Non-supportive Active, Supportive Inactive, Supportive Aware,

Supportive Aroused, and Supportive Active (Figure 3.1). Level of support was measured with an eight-item, five-point bipolar semantic differential scale. Statements included "Genetically modified food is:" Good/Bad, Positive/Negative, Beneficial/Not Beneficial, Acceptable/Not Acceptable, Necessary/Unecessary, Important/Unimportant, Essential/Not Essential, and Crucial/Trivial. Positive statements were coded as a 5 and negative statements were coded as a 1. An index was created by summating each item and calculating the average. A dichotomous variable was then created. Respondents were coded as *Supportive* if their mean on the index was equal to or higher than the average for the sample (*M = 2.83, SD = 1.05*). Respondents were coded as *Non-supportive* if their index was below the mean.

Issue involvement was measured with a four-item, five-point bipolar semantic differential scale. Statements included: 1) I am very concerned about genetically modified food, 2) I am not at all concerned about genetically modified food, 3) I am bothered by genetically modified food, and 4) I am not bothered by genetically modified food. Positive statements were coded as a 5 and negative statements were coded as a 1. An index was created by summating each item and calculating the average. A dichotomous variable for issue involvement was then created. Respondents were coded as *High issue involvement* if their mean on the index was equal to or higher than the average for the sample (*M* = 3.15, *SD* = 1.25). Respondents were coded as *Low issue involvement* if their index was below the mean.

Knowledge was assessed by asking respondents five questions; asking if some genetically modified crops have been modified for increased herbicide resistance; if genetically modified food can be sold as organic; if the USDA has deemed genetically modified food as safe to eat; if plants or animals whose cells have been inserted with a gene from an unrelated species is considered genetically modified, and from the list provided, which food crop does not have a

genetically modified variety available for human consumption within the United States. A count variable was created for the knowledge construct and each correct answer counted as one point. The scale ranged from zero (no knowledge) to five (complete knowledge). If respondents answered at least four questions correctly, they were coded as having *High knowledge*. *Low knowledge* included respondents answering between zero and three questions correctly.

Publics categories were coded depending on respondents' level of support, followed by issue involvement and knowledge. Once divided based on level of support, those with low issue involvement and low knowledge were coded as Inactive publics and respondents with low issue involvement and high knowledge were coded as Aware publics. Aroused publics included high issue involvement and low knowledge and the Active publics included respondents with high knowledge and high issue involvement (Hallahan, 2000).

Table 3.2
Breakdown of Respondents into Public Groupings

Group	*n*	*%*
Non-supportive *(n = 176)*		
Inactive (Low Issue Involvement/ Low Knowledge)	19	10.8
Aware (Low Issue Involvement/ High Knowledge)	14	8.0
Aroused (High Issue Involvement/ Low Knowledge)	66	37.5
Active (High Issues Involvement/ High Knowledge)	77	43.8
Supportive (*n* = 211)		
Inactive (Low Issue Involvement/ Low Knowledge)	98	46.4
Aware (Low Issue Involvement/ High Knowledge)	76	36.0
Aroused (High Issue Involvement/ Low Knowledge)	19	9.0
Active (High Issues Involvement/ High Knowledge)	18	8.5

Participant Selection and Distribution

Non-probability quota sampling methods were used to collect the sample for the study (Dillman, Smyth, & Christian, 2014). Millennials were chosen as the target population because they are unique in terms of their perspectives, motivations, decision-making rationales, and value drivers (Boyd, 2010; Kim et al., 2009; Weiss, 2003). They are roughly three times the size of

Generation X and have high discretionary incomes, even though the majority are still continuing their education at higher institutions (Foscht et al., 2009; Palmer, 2008). In fact, millennials exceed all prior generational expenditures and have a large direct contribution to the economy (Jang et al., 2011; O'Donnell, 2006) that is further indirectly increased due to the fact that they influence the majority of family purchase decisions (Morton, 2002; Taylor & Cosenza, 2002). Since the target population (millennials) typically have access to the Internet, an online survey instrument was used (Dillman, Smyth, & Christian, 2014). Qualtrics, an online survey company, was used to secure 525 paid responses. Two attention filter questions were reverse coded to identify respondents who randomly answered questions. After removing respondents from the sample who randomly answered questions, the final analysis included a response rate of 73.7% with 387 usable responses, which is above the recommended minimum of 384 responses needed to secure a 95% confidence level (Dillman, Smith, & Christian, 2009). The sample was weighted to be representative of United States census data of resident millennials between the ages of 18 and 36 based on gender and ethnicity. However, since a large number of respondents (n = 138) had to be removed from the survey, the final survey sample differs slightly from targeted census data. Initial data collection aimed for 51% female, 49% male and 18% Hispanic/Latino, 75% Caucasian, 16% African American, 8% Asian, and 1% Native Indian, Native Hawaiian, Pacific Islander, or Other. The final data sample contained 53.2% female, 45.2% male, and 6% other. Additionally, the ethnicity of the final sample was 16.5% Hispanic/Latino, 71.8% Caucasian, 11.9% African American, 4.1% Pacific Islander, .5% Asian, .3% Native Hawaiian, and 0% Native American or Other.

Data Analysis

A variety of tests and analyses were conducted to answer the research questions,

including frequency statistics, descriptive statistics, means comparisons, one-way analysis of variances, and correlations. Specifically, descriptive statistics and frequencies were used to answer RO 1. Questions for RO 1 included asking for respondent's gender, age, year they were born, ethnicity/race, the highest level of education achieved, if they currently had any children living in the home and how many, political affiliation, and household income.

Questions used to address RO 2 included a 5-item, 5-point Likert-type scale where 1 = lowest and 5 = highest. Within the scale, two factors were identified and utilized, Media Distort and Media Processing Cues. Media Distort questions included 1) The media often exaggerate and sensationalize the news and 2) News media often represent their own bias and interests. Questions for Media Processing Cues included 1) When the same item appears in many places, I'm more likely to believe it, 2) Stories with statistics are more believable than those without, and 3) Individual news items may seem like bits and pieces, but in the long run, they form a meaningful pattern. A one-way analysis of variance was used to answer this research question and addressed both of the factors as well as an overall Relevant Channel Beliefs score. Cronbach's alpha was .67, which was slightly below the desired .70 considered reliable (DeVellis, 2012).

RO 3 used two sliding scales to assess respondents' knowledge gaps or lack thereof. The first slider scale asked respondents to rate their current perceived level of knowledge of the risks of genetically modified food on a scale of 1 to 100 where 1 = knowing nothing and 100 = knowing everything there is to know. The second scale asked respondents to rate the level of knowledge they think they would need to know in order to make an informed decision. Current knowledge was subtracted from needed knowledge and those with negative scores were coded as having a knowledge deficit, those with a positive score were coded as having a knowledge

excess, and those with no difference between the two scores were coded as neutral. Means also were calculated for each of the eight groups and compared using a one-way analysis of variance. Additionally, frequency statistics were calculated to assess the frequency of knowledge deficits, excesses, and neutrals within each of the eight groups.

Questions addressing RO 4 included two 5-point Likert-type items where 1 = lowest and 5 = highest. Questions included: 1) If I wanted to, I could easily get all the information I need about genetically modified food and 2) It is hard for me to get useful information about genetically modified food. A one-way analysis of variance was then used to compare differences among the groups for each of the items as well as means comparisons.

RO 5 was addressed using four scales with multiple 5-point Likert-type items where 1 = lowest and 5 = highest. The first being Heuristic processing, which included 4 items asking respondents 1) When I encounter information about genetically modified food, I focus on only a few points, 2) If I have to act on this matter, the advice of one expert is good enough for me, 3) When I see or hear information about genetically modified food, I rarely spend much time thinking about it, and 4) There is far more information on genetically modified food than I personally need. Cronbach's alpha for this scale was .71, which was above the recommended minimum level of .70 (DeVellis, 2012).

Systematic processing was assessed using multiple 5-point Likert-type items where 1 = lowest and 5 = highest. Items included, 1) After I encounter information about genetically modified food, I am likely to stop and think about it, 2) If I need to act on this matter, the more viewpoints I get the better, 3) It is important for me to interpret information about genetically modified food in a way that applies directly to my life, 4) After thinking about genetically modified food, I have a broader understanding of it, and 5) When I encounter information about

this topic, I read or listen to most of it, even though I may not agree with its perspective. This scale had a Cronbach's alpha of .80, which is above the minimum recommended reliability level of .70 (DeVellis, 2012).

Active Information Seeking was addressed using 2 items, 1) When the topic of risks of genetically modified food come up, I try to learn more about it and 2) When it comes to the risk of genetically modified food, I'm likely to go out of my way to get more information.

Information Avoidance was addressed using a three-item Likert-type scale, 1) When the topic of genetically modified food comes up, I'm likely to tune it out, 2) Whenever the topic of genetically modified food comes up, I go out of my way to avoid learning more about it, and 3) Gathering a lot of information about the risks of genetically modified food is a waste of time. Cronbach's alpha was .73, which is above the recommended minimum level of .70 for reliability.

Correlations were between Heuristic and Systematic Processing as well as between Active Information Seeking and Information Avoidance also were calculated. Additionally, a one-way analysis of variance was used to identify significant differences in the mean scores for Heuristic Processing, Systematic Processing, Active Information Seeking, and Information Avoidance among the eight public groups. Means comparisons also were used for the four variables to identify trends among the groups.

Summary of Chapter

Little research has been done to assess the ways in which millennials are looking for and subsequently processing information about genetically modified food. Understanding the behaviors of this group is important because they have a large portion of purchasing power and influence politically. The purpose of thus study was to identify Supportive and Non-supportive millennial publics and the factors that determine their information search and processing

behaviors. This study focused on examining the relevant channel beliefs, perceived knowledge gaps, and perceived information gathering capacity of millennial publics. This study surveyed 525 paid respondents using Qualtrics, an online survey company. Respondents were categorized as supportive or non-supportive, having high issue involvement or low issue involvement, and low or high knowledge. This was utilized to then sort respondents into one of eight final public groups. The survey consisted of 47 items and was reviewed by a panel of experts for face and content validity. Following the review of the instrument, the five knowledge questions were clarified and reworded. Terminology was also updated to be consistent with the term genetically modified food. Cronbach's alpha was used to analyze the data set for internal consistency of items. Reverse coding was utilized to identify any respondents who randomly answered questions. Additionally, the survey was tested with millennial-age graduate students. The survey was soft launched and collection was paused at 8% (n = 40). Collection was resumed once the survey was checked one final time for flaws and none were found.

Non-probability quota sampling methods were used to collect the study sample. After removing respondents who randomly answered questions from the sample, the final analysis included a response rate of 73.7% with 387 usable responses. This was above the recommended minimum of 384 responses needed to obtain a 95% confidence level. The initial sample was weighted to be representative of the U.S. census data of resident millennials between the ages of 18 and 36 based on gender and ethnicity. Frequency statistics, descriptive statistics, means comparisons, one-way analyses of variances, and correlations were utilized for data analysis.

Chapter 4 - Results

Introduction

The purpose of this study was to identify Supportive and Non-supportive millennial publics and the factors that determine how these millennial publics seek and process risk information about genetically modified food. Specifically, this study examined relevant channel beliefs, perceived knowledge gaps, and perceived information gathering capacity of millennial publics. This study also went one step further than the Situational Theory of Public by differentiating between Supportive and Non-supportive publics.

Guided by the Risk Information Seeking and Processing model and the Situational Theory of Publics, the research objectives for this study were:

RO 1: Identify the individual characteristics of Supportive and Non-supportive millennial publics of genetically modified food.

RO 2: Examine relevant channel beliefs of Supportive and Non-supportive millennial publics of genetically modified food.

RO 3: Identify and describe the information gap of Supportive and Non-supportive millennial publics of genetically modified food.

RO 4: Define the perceived information gathering capacity of Supportive and Non-supportive millennial publics of genetically modified food.

RO 5: Characterize the information seeking and processing behavior of Supportive and Non-supportive millennial publics of genetically modified food.

This chapter first looks at the demographics of the entire sample and then is broken down by the five research objectives. The total number of usable responses to this study's survey was $N = 387$.

Demographics

Demographic data were collected for gender, age, ethnicity, education, income, hazard experiences, political party, whether or not respondents had children living in the home, and how many children were in the home. All respondents completed the entire demographic section except for the question asking about the number of children living in the home. Respondents who answered "no" to having children that lived in the home were not shown the question asking how many children lived with them.

Gender

The majority of respondents reported they were female (n = 206, 53.2%). Of the remaining respondents, 175 (45.2%) reported being male and 6 (1.6%) reported their gender as other.

Age

Age of respondents ranged from 18 to 36 (Table 4.1) with a mean age of 27.2 (SD = 5.1). The ages with the most responses included 32 (n = 29, 7.5%) and 34 (n = 29, 7.5%). The age with the fewest responses was 36 (n = 1, .3%).

Table 4.1
Frequency of Respondent Ages (N = 387)

Age	*n*	*%*
32	29	7.5
34	29	7.5
21	28	7.2
27	26	6.7
31	26	6.7
26	25	6.5
30	25	6.5
33	22	5.7
22	21	5.4
28	21	5.4
23	20	5.2
35	20	5.2
18	17	4.4
25	17	4.4
20	16	4.1
24	16	4.1
29	16	4.1
19	12	3.1
36	1	0.3

Ethnicity

The majority of respondents reported their ethnicity as Caucasian (white) (n = 278, 71.8%) (Table 4.2). Hawaiian (n = 1, .3%) was the ethnicity with the least amount of respondents. None of the respondents selected Native American or Other as their ethnicity. It is important to note that respondents were allowed to select more than one ethnicity.

Table 4.2
Frequency of Ethnicity of Respondents (N = 387)

Reported Ethnicity	n	%
Caucasian	278	71.8
Hispanic	64	16.5
African American	46	11.9
Pacific Islander	16	4.1
Asian	2	0.5
Hawaiian	1	0.3
Native American	-	-
Other	-	-

Education

The majority of respondents to the survey had at least a high school education or equivalent, with the highest level of respondents (n = 115, 29.7%) reporting they had received some college education, but no degree (Table 4.3). The least reported education level was for the respondents with less than 12th grade education (n = 11, 2.8%).

Table 4.3
Education Level of Respondents (N = 387)

Education Level	*n*	*%*
Some college, no degree	115	29.7
2-year college degree	99	25.6
High School Graduate	83	21.4
Graduate or Professional degree	56	14.5
4-year college degree	23	5.9
Less than 12th Grade	11	2.8

Income

Income was reported in $25,000 intervals, starting at $25,000 or less and going to $250,000 or more (Table 4.4). The largest percentage of respondents were those whose income was $25,000 to $49,999 ($n$ = 116, 30%). The smallest income groups were $200,000 to $224,999

(n = 3, 0.8%) and $250,000 or more ($n$ = 3, 0.8%).

Table 4.4
Frequency of Reported Income of Respondents (N = 387)

Income level	*n*	*%*
$25,000 to $49,999	116	30.0
$50,000 to $74,999	91	23.5
Less than $25,000	68	17.6
$75,000 to $99,999	61	15.8
$100,000 to $124,999	19	4.9
$125,000 to $149,999	15	3.9
$150,000 to $174,999	7	1.8
$175,000 to $199,999	4	1.0
$200,000 to $224,999	3	0.8
$225,000 to 249,999	-	-
$250,000 or more	3	0.8

Political Party Identification

The largest group of respondents (n = 142, 36.7%) reported they identified as Liberal (Table 4.5). The fewest reported identifying themselves as Green Party (n = 12, 3.1%). Of the respondents who identified with "Other" political party, the majority reported themselves as Independent, Moderate, or not belonging to any party.

Table 4.5
Frequency of Political Party Identification (N = 387)

	n	*%*
Liberal	142	36.7
Conservative	135	34.9
Other	75	19.4
Libertarian	23	5.9
Green Party	12	3.1

Children Living in the Home

Respondents were asked if they had any children living in the home with them. If they answered yes, then they were asked how many children lived with them. A majority of respondents (n = 205, 53.0%) answered that they did not have any children residing within their homes. Of the respondents who answered that they did have children living in the home (n = 182, 47.0%), the number of children living in the home ranged from 1 to 4 with a mean of 1.7 (SD = .80) and a median of 2.0.

Relevant Hazard Experiences

Respondents were asked if they had ever experienced any negative consequences from consuming genetically modified food. The majority (n = 214, 55.3%) responded that they had not experienced any negative consequences. About a third of respondents (n = 128, 33.1%) were not sure and the remaining respondents (n = 45, 11.6%) reported they had experienced negative consequences from consuming genetically modified food. There was no follow-up to identify the negative consequences.

Public Groupings

Participants were divided into one of eight public groups based on level of support, level of issue involvement, and level of knowledge. When sorted into their Supportive or Non-supportive categories, a greater number of respondents were sorted into the Supportive category (n = 211, 54.5%) than the Non-supportive (n = 175, 45.5%) (Table 4.6). When sorted into one of Hallahan's (2000) four publics, the greatest number of respondents fit into the Inactive public (Table 4.7).

Table 4.6

Breakdown of Respondents Based on Level of Support

Level of Support	*n*	*%*
Supportive	211	54.5
Non-supportive	176	45.5

Table 4.7

Breakdown of Respondents by Public Grouping

Group	*n*	*%*
Inactive (Low Issue Involvement/ Low Knowledge)	117	30.2
Active (High Issue Involvement/ High Knowledge)	95	24.5
Aware (Low Issue Involvement/ High Knowledge)	90	23.3
Aroused (High Issue Involvement/ Low Knowledge)	85	22

Table 4.8

Breakdown of Respondents by Public Grouping Within Support Category

Group	*n*	*%*
Supportive		
Inactive	98	46.4
Aware	76	36.0
Aroused	19	9.0
Active	18	8.5
Non-supportive		
Inactive	19	10.8
Aware	14	8.0
Aroused	66	37.5
Active	77	43.8

Research Objective 1

RO 1: Identify the individual characteristics of Supportive and Non-supportive millennial publics of genetically modified food.

Respondents were asked a variety of demographic and sociocultural questions including gender, ethnicity, education level, income, hazard experiences with genetically modified food,

political affiliation, whether or not children lived in their home with them, and how many children lived with them.

Gender

Respondents were asked what gender they most readily identified with (Table 4.9). The largest group of respondents in all four Non-supportive public groups was female. Of the Supportive groups, three of the four publics (Inactive, Aware, and Active) had a larger percentage of male respondents than female or other. The least frequently chosen option for all eight publics was other.

Table 4.9
Gender Frequencies by Public Grouping

	Inactive *n (%)*	Aware *n (%)*	Aroused *n (%)*	Active *n (%)*
Non-supportive				
Male	8 (42.1)	6 (42.9)	22 (33.3)	29 (37.7)
Female	10 (52.6)	8 (57.1)	44 (66.7)	47 (61.0)
Other	1 (5.3)	-	-	1 (1.3)
Supportive				
Male	54 (55.1)	39 (51.3)	8 (42.1)	9 (50.0)
Female	42 (42.9)	36 (47.4)	11 (57.9)	8 (44.4)
Other	2 (2.0)	1 (1.3)	-	1 (5.6)

Age

Respondents were asked to provide their current age (Table 4.10). A one-way between-groups analysis of variance was calculated to explore the differences in mean age among the eight public groups. However, there were not any significant differences at the $p < .05$ level in mean age for the eight public groups: F (7, 379) = 1.87, p = .05.

Table 4.10
Age of Respondents by Public Group

Public Groups	Non-supportive				Supportive			
	n	Min	Max	Mean	*n*	Min	Max	Mean
Inactive	19	19	34	25.4	98	18	35	26.6
Aware	14	19	34	26.9	76	18	35	27.7
Aroused	66	18	35	28.1	19	18	34	24.8
Active	77	18	36	27.8	18	18	34	26.0

Ethnicity

Respondents were asked the ethnicity(s) that best described them (Table 4.11). The majority of respondents in all eight groups were Caucasian. The minority ethnicity for the Non-supportive Inactive public was African American (*n* = 3, 15.8%). The least represented ethnicity for the Non-supportive Active public was both Latino (*n* = 2, 14.3%) and African American (*n* = 2, 14.3%). The least represented ethnicity for the Non-supportive Aroused public was Latino (*n* = 11, 16.7%). The least represented ethnicity for the Non-supportive Active public was African American (*n* = 8, 10.4%). The least represented ethnicity for the Supportive Inactive public was Asian (*n* = 2, 2%). Which included all Asian respondents in the study. The least represented ethnicity for the Supportive Aware public was African American (*n* = 3, 3.9%). The least represented ethnicity for the Supportive Aroused public was Hawaiian (*n* = 1, 5.3%) and was the only Hawaiian respondent within the study. The least represented ethnicity for the Supportive Active public was Latino (*n* = 1, 5.6%). Across the groups, Caucasian was the most common, with other ethnicities across the group consistent with census data.

Table 4.11
Respondent Ethnicity by Public Grouping

Public Groups	*n*	Caucasian *n (%)*	Latino *n (%)*	African American *n (%)*	American Indian *n (%)*	Asian *n (%)*	Hawaiian *n (%)*	Other *n (%)*
Non-supportive								
Inactive	19	12 (63.2)	4 (21.1)	3 (15.8)	-	-	-	-
Aware	14	10 (71.4)	2 (14.3)	2 (14.3)	-	-	-	-
Aroused	66	42 (63.6)	11 (16.7)	13 (19.7)	-	-	-	-
Active	77	51 (66.2)	19 (24.7)	8 (10.4)	-	-	-	-
Supportive								
Inactive	98	73 (74.5)	15 (15.3)	10 (10.2)	-	2 (2)	-	-
Aware	76	63 (82.9)	10 (13.2)	3 (3.9)	-	-	-	-
Aroused	19	13 (68.4)	2 (10.5)	4 (21.1)	-	-	1 (5.3)	-
Active	18	14 (77.8)	1 (5.6)	3 (16.7)	-	-	-	-

Children Living in the Home

Respondents were also asked if they had any children living in the same home as them (Table 4.12) and if so, how many children (Table 4.13). Of all eight publics, only the Non-supportive Active public had a majority of respondents who reported having children in the home ($n = 41$, 53.2%). The Non-supportive Aroused public contained an equal number of respondents who did ($n = 33$, 50%) and did not ($n = 33$, 50%) have children living with them in the home. The rest of the publics all had a majority of respondents who reported not having any children in the home.

Additionally, a one-way between-groups analysis of variance was conducted to explore the differences in the number of children among the eight public groups. However, there was no statistical difference at the $p < .05$ level in the number of children for the eight groups.

Table 4.12
Frequency of Respondents with Children Living in the Home

Public Groups	*n*	Children *n (%)*	
		Yes	No
Non-supportive			
Inactive	19	7 (36.8)	12 (63.2)
Aware	14	5 (35.7)	9 (64.3)
Aroused	66	33 (50.0)	33 (50.0)
Active	77	41 (53.2)	36 (46.8)
Supportive			
Inactive	98	44 (44.9)	54 (55.1)
Aware	76	36 (47.4)	40 (52.6)
Aroused	19	9 (47.4)	10 (52.6)
Active	18	7 (38.9)	11 (61.1)

Table 4.13
Number of Reported Children
(n = 196)

	n	Number of Children *n (%)*			
		1	2	3	4
Non-supportive					
Inactive	7	3 (42.9)	2 (28.6)	2 (28.6)	-
Aware	19	1 (20.0)	2 (40.0)	2 (40.0)	-
Aroused	33	17 (51.5)	9 (27.3)	7 (21.2)	-
Active	41	13 (31.7)	23 (56.1)	3 (7.3)	2 (4.9)
Supportive					
Inactive	44	27 (61.4)	11 (25.0)	2 (4.5)	4 (9.1)
Aware	36	19 (52.8)	12 (33.3)	5 (13.9)	-
Aroused	9	4 (44.4)	5 (55.6)	-	-
Active	7	4 (57.1)	3 (42.9)	-	-

Political Affiliation of Publics

Respondents were asked their political affiliation (Table 4.14). The largest percent of the Non-supportive Inactive public (*n* = 7, 36.8%) identified themselves as Liberal. The smallest percentage identified themselves as Libertarian (*n* = 2, 10.5%). The largest percentage of the Non-supportive Aware public also identified as Liberal (*n* = 6, 42.9%). The smallest percentage identified themselves as Libertarian (n = 1, 7.1%). The largest percentage the Non-supportive

Aroused public identified as Liberal (*n* = 23, 34.8%). The smallest percentage identified themselves as Libertarian (*n* = 2, 3.0%). Unlike the rest of the Non-supportive publics, the largest percentage the Non-supportive Active public identified as belonging to the Conservative party (*n* = 34, 44.2%). The smallest percentage identified themselves as Green Party (*n* = 3, 3.9%)

The largest percentage of the Supportive Inactive public identified with the Conservative party (*n* = 40, 40.8%) and the least identified as Green Party (*n* = 4, 4.1%). The largest percentage of Supportive Aware public identified as Liberal (*n* = 35, 46.1%) and the minority identified as Libertarian (*n* = 4, 5.3%). The largest percentage of the Supportive Aroused public also identified as Liberal (*n* = 10, 52.6%) with the least reported political party being Libertarian (*n* = 2, 10.5%). The Supportive Active public had an equal number of respondents identifying as Liberal (*n* = 3, 33.3%), Conservative (*n* = 3, 33.3%), and Other (*n* = 3, 33.3%). In general, political affiliation was fairly balanced between Conservatives and Liberals, accounting for 2/3 to 3/4 of respondents with the rest of respondents spread across a multitude of affiliations.

Table 4.14
Political Affiliation by Public Grouping

Public Groups	*n*	Liberal *n* (%)	Conservative *n* (%)	Libertarian *n* (%)	Green Party *n* (%)	Other *n* (%)
Non-supportive						
Inactive	19	7 (36.8)	6 (31.6)	2 (10.5)	-	4 (21.1)
Aware	14	6 (42.9)	5 (35.7)	1 (7.1)	-	2 (14.3)
Aroused	66	23 (34.8)	15 (22.7)	2 (3.0)	5 (7.6)	21 (31.8)
Active	77	24 (31.2)	34 (44.2)	5 (6.5)	3 (3.9)	11 (14.3)
Supportive						
Inactive	98	31 (31.6)	40 (40.8)	7 (7.1)	4 (4.1)	16 (16.3)
Aware	76	35 (46.1)	25 (32.9)	4 (5.3)	-	12 (15.8)
Aroused	19	10 (52.6)	4 (21.1)	2 (10.5)	-	3 (15.8)
Active	18	6 (33.3)	6 (33.3)	-	-	6 (33.3)

Education

Respondents were asked to provide their highest level of education (Table 4.15). All of

the Non-supportive Inactive public had at least a high school diploma, with the highest level of respondents (n = 6, 31.6%) being high school graduates. The least reported education level was for the respondents with four-year degrees (n = 1, 5.3%). All of the Non-supportive Aware public had at least a high school diploma with the highest level of respondents (n = 7, 50.0%) being those with a two-year college degree. The least reported education level was Graduate/Professional degrees (n = 1, 7.1%). The majority of the Non-supportive Aroused public (n = 64, 97.0%) reported having at least a high school diploma. The highest level of respondents (n = 22, 33.3%) had some college education, but no degree and the least reported education level was both those with less than a 12th grade education (n = 2, 3.0%) and four-year college degrees (n = 2, 3.0%). The Non-supportive Active public all had at least a high school diploma. The most frequently reported education level was some college, but no degree (n = 27, 35.1%) and the least reported education level was four-year college degree (n = 3, 3.9%).

The majority of the Supportive Inactive public (n = 92, 93.9%) had at least a high school diploma. The highest level of respondents had some college, but no degree (n = 28, 28.6%). The least reported education level was less than a 12th grade education (n = 6, 6.1%). The majority of the Supportive Aware public had at least a high school education (n = 75, 98.7%). The highest level of respondents was those with some college, but no degree and the least reported education level was less than a 12th grade degree (n = 1, 1.3%). The majority of the Supportive Aroused public also had at least a high school diploma (n = 17, 89.5%). The highest level of respondents was high school graduates (n = 6, 32.6%) and the least frequently reported was less than a 12th grade degree (n = 2, 10.5%). All of the Supportive Active public achieved at least a high school diploma. The most frequently reported education level was two-year college degree (n = 8, 44.4%) and the least frequently reported was both four-year college degree (n = 1, 5.6%) and

graduate/professional degree (*n* = 1, 5.6%).

Table 4.15
Highest Level of Education Achieved by Public Grouping

Public Groups	*n*	Less than 12th grade *n* (%)	High school graduate *n* (%)	Some college, no degree *n* (%)	2-year college degree *n* (%)	4-year college degree *n* (%)	Graduate or Professional Degree *n* (%)
Non-supportive							
Inactive	19	-	6 (31.6)	5 (26.3)	5 (26.3)	1 (5.3)	2 (10.5)
Aware	14	-	2 (14.3)	4 (28.6)	7 (50.0)	-	1 (7.1)
Aroused	66	2 (3.0)	19 (28.8)	22 (33.3)	13 (19.7)	2 (3.0)	8 (12.1)
Active	77	-	12 (15.6)	27 (35.1)	20 (26.0)	3 (3.9)	15 (19.5)
Supportive							
Inactive	98	6 (6.1)	19 (19.4)	28 (28.6)	25 (25.5)	8 (8.2)	12 (12.2)
Aware	76	1 (1.3)	14 (18.4)	23 (30.3)	17 (22.4)	8 (10.5)	13 (17.1)
Aroused	19	2 (10.5)	6 (31.6)	3 (15.8)	4 (21.1)	-	4 (21.1)
Active	18	-	5 (27.8)	2 (16.7)	8 (44.4)	1 (5.6)	1 (5.6)

Income

Respondents were asked to provide their income (Table 4.16). The most frequently reported level of income for the Non-supportive Inactive public was $25,000 to $49,999 (*n* = 7, 36.8%) and the least frequently reported level of income was less than $25,000 (*n* = 3, 15.8%). For the Non-supportive Aware public, the most frequently reported income level was $25,000 to $49,999 (*n* = 4, 28.6%) and the least frequently reported income level was equal between $75,000 to $99,999 (*n* = 1, 7.1%), $200,000 to $224,999 (*n* = 1, 7.1%), and $250,000 or more (*n* = 1, 7.1%). The most frequently reported income level of the Non-supportive Aroused public was $25,000 to $49,999 (*n* = 26, 39.4%) and the least frequently reported income level was both $150,000 to $174,999 (*n* = 2, 3.0%) and $175,000 to $199,999 (*n* = 2, 3.0%). The most frequently reported income level of the Non-supportive Active public was $50,000 to $74,999 (*n* = 27, 35.1%) and the least frequently reported income level was $150,000 to $174,999 (*n* = 1, 1.3%).

The most frequently reported income level of the Supportive Inactive public was less than $25,000 (*n* = 25, $25.5%) and the least frequently reported income level was both $220,000 to $224,999 (*n* = 1, 1.0%) and $250,000 or more (*n* = 1, 1.0%). Of the Supportive Aware public, the most frequently reported income level was $25,000 to $49,999 (*n* = 21, 27.6%) and the least frequently reported income levels were equally $175,000 to $199,999 (*n* = 1, 1.3%), $200,000 to $224,999 (*n* = 1, 1.3%), and $250,000 or more (*n* = 1, 1.3%). The most frequently reported income level of the Supportive Aroused public was $25,000 to $49,999 (*n* = 7, 36.8%) and the least frequently reported was $75,000 to $99,999 (*n* = 1, 5.3%). Of the Supportive Active public, the most frequently reported Income Level was both equally $25,000 to $49,999 (*n* = 6, 33.3%) and $50,000 to $74,999 (*n* = 6, 33.3%). The least reported income level was less than $25,000 (*n* = 1, 5.6%).

Table 4.16
Income of Respondents by Public Grouping

	Non-supportive *n (%)*				Supportive *n (%)*			
	Inactive (*n* = 19)	Aware (*n* = 14)	Aroused (*n* = 66)	Active (*n* = 77)	Inactive (*n* = 98)	Aware (*n* = 76)	Aroused (*n* = 19)	Active (*n* = 18)
Less than $25,000	3 (15.8)	2 (14.3)	13 (19.7)	10 (13.0)	25 (25.5)	8 (10.5)	6 (31.6)	1 (5.6)
$25,000 to $49,999	7 (36.8)	4 (28.6)	26 (39.4)	25 (32.5)	20 (20.4)	21 (27.6)	7 (36.8)	6 (33.3)
$50,000 to $74,999	4 (21.1)	2 (14.3)	11 (16.7)	27 (35.1)	16 (16.3)	20 (26.3)	5 (26.3)	6 (33.3)
75,000 to $99,999	5 (26.3)	1 (7.1)	10 (15.2)	7 (9.1)	20 (20.4)	12 (15.8)	1 (5.3)	5 (27.8)
$100,000 to $124,999	-	3 (21.4)	2 (3.0)	4 (5.2)	6 (6.1)	4 (5.3)	-	-
$125,000 to $149,999	-	-	2 (3.0)	3 (3.9)	5 (5.1)	5 (6.6)	-	-
$150,000 to $174,999	-	-	1 (1.5)	1 (1.3)	2 (2.0)	3 (3.9)	-	-
$175,000 to $199,999	-	-	1 (1.5)	-	2 (2.0)	1 (1.3)	-	-
$200,000 to $224,999	-	1 (7.1)	-	-	1 (1.0)	1 (1.3)	-	-
$250,000 or more	-	1 (7.1)	-	-	1 (1.0)	1 (1.3)	-	-

Relevant Hazard Experiences

Respondents were asked at the end of the survey if they had or had not ever experienced negative consequences from consuming genetically modified food. The majority of respondents within each group (Table 4.17) responded that they believe they have never experienced or were not sure if they had ever experienced negative consequences from consuming genetically modified food.

Table 4.17
Relevant Hazard Experiences by Public Grouping

Public Groups	*n*	Yes *n (%)*	No *n (%)*	Not Sure *n (%)*
Non-supportive				
Inactive	19	1 (5.3)	14 (73.7)	4 (21.1)
Aware	14	-	12 (85.7)	2 (14.3)
Aroused	66	18 (27.3)	22 (33.3)	26 (39.4)
Active	77	7 (9.1)	29 (37.7)	41 (53.2)
Supportive				
Inactive	98	9 (9.2)	66 (67.3)	23 (23.5)
Aware	76	5 (6.6)	53 (69.7)	18 (23.7)
Aroused	19	4 (21.1)	7 (36.8)	8 (42.1)
Active	18	1 (5.6)	11 (61.1)	6 (33.3)

Research Objective 2

RO 2: Examine relevant channel beliefs of each of Supportive and Non-supportive millennial publics of genetically modified food.

Respondents were asked a series of questions concerning their channel beliefs. Factors included Media Distort, Media Processing Cues, and Overall Channel Beliefs. A one-way between-groups analysis of variance was conducted to explore the differences of channel beliefs among public groups (Table 4.18). There was not a statistically significant difference among the groups at the $p < .05$ level in mean Media Distort scores for the eight public groups: $F (7, 379) = 1.030$, $p = .4$. There also was not a statistically significant difference among the groups at the $p <$

.05 level in Media Processing Cue scores for the eight public groups: F (7, 379) = .9, p =.5. Lastly, there was not a statistically significant difference among the groups at the p < .05 level in Overall Channel Belief scores for the eight public groups: F (7, 379) = 1.2, p = .29. (Table 4.18).

Table 4.18
Relevant Channel Beliefs Descriptives

		MDa	MPCb	OCBc
	n	*M (SD)*	*M (SD)*	*M (SD)*
Non-supportive				
Inactive	19	4.21 (.73)	3.54 (.63)	3.81 (.49)
Aware	14	3.90 (.98)	3.45 (.61)	3.63 (.45)
Aroused	66	4.07 (1.0)	3.49 (.85)	3.72 (.71)
Active	77	4.07 (.88)	3.65 (.73)	3.84 (.65)
Supportive				
Inactive	98	3.93 (1.14)	3.42 (.79)	3.62 (.77)
Aware	76	4.16 (.78)	3.60 (.65)	3.82 (.53)
Aroused	19	3.68 (1.07)	3.37 (.90)	3.49 (.89)
Active	18	3.75 (1.20)	3.50 (.67)	3.60 (.77)

Note: MD = Media Distort, MPC = Media Processing Cues, OCB = Overall Channel Beliefs
[a]MD on a 5 point scale with 1 equals Strongly Disagree and 5 equals Strongly Agree
[b]MPC on a 5 point scale with 1 equals Strongly Disagree and 5 equals Strongly Agree
[c]OCB on a 5 point scale with 1 equals Strongly Disagree and 5 equals Strongly Agree

Research Objective 3

RO 3: Identify the perceived knowledge gap of Supportive and Non-supportive millennial publics of genetically modified food.

Respondents were asked to rate their current knowledge of genetically modified food on a scale of 0 to 100 and to rate the level of knowledge they feel they need to make an informed decision on a scale of 0 to 100. The difference between their perceived level of needed knowledge and perceived level of current knowledge is their knowledge gap (Table 4.19). A higher current knowledge than needed knowledge is coded as knowledge excess. A higher needed knowledge than current knowledge is coded as a knowledge deficit. An equal level of current knowledge and needed knowledge is coded as neutral.

The majority of respondents (65.3% or greater) in all eight public groups reported a knowledge deficit (Table 4.19). The least reported knowledge gap among all eight groups was neutral.

Table 4.19
Frequency of Knowledge Deficit and Excess

		Excess	Deficit	Neutral
	n	*n (%)*	*n (%)*	*n (%)*
Non-supportive	177	34 (19.2)	139 (78.5)	4 (2.3)
Inactive	19	5 (26.3)	14 (73.7)	-
Aware	14	3 (21.4)	11 (78.6)	-
Aroused	66	12 (18.2)	52 (78.8)	3 (3.0)
Active	77	14 (18.2)	62 (80.5)	1 (1.3)
Supportive	211	48 (22.7)	153 (72.5)	4 (2.3)
Inactive	98	26 (26.5)	64 (65.3)	8 (8.2)
Aware	76	13 (17.1)	62 (81.6)	1 (1.3)
Aroused	19	6 (31.6)	13 (68.4)	-
Active	18	3 (16.7)	14 (77.8)	1 (5.6)

A one-way between-groups analysis of variance was conducted to explore the differences in knowledge gaps among the eight different public groups (Table 4.20). There was a statistically significant difference at the $p < .05$ level in knowledge gap scores for the eight public groups: $F(7, 379) = 2.4$, $p = .019$ (Table 4.20). Post-hoc comparisons using Tukey HSD test indicated that the mean score for the Supportive Aware public ($M = 31.5$, $SD = 32.9$) was significantly different from the Supportive Inactive public ($M = 16.8$, $SD = 24.1$). None of the other public groups differed significantly from each other.

Table 4.20
Knowledge Gap Descriptive Statistics by Public Grouping

	n	*M (SD)*	Minimum	Maximum	Range
Non-supportive					
Inactive	19	22.2 (26.3)	-17	66	83
Aware	14	18.6 (36.6)	-59	85	144
Aroused	66	19.1 (28.8)	-98	91	189
Active	77	24.5 (25.2)	-30	82	112
Supportive					
Inactive	98	16.8 (24.1)	-24	87	111
Aware	76	31.5 (32.9)	-59	91	150
Aroused	19	12.4 (25.3)	-20	87	107
Active	18	28.6 (27.0)	-15	90	105

A one-way between-groups analysis of variance was conducted to explore the differences in current knowledge among the eight different public groups (Table 4.21). There was a statistically significant difference at the $p < .05$ level in current knowledge scores for the eight public groups: F (7, 379) = 4.3, p = .000 (Table 4.21). Post-hoc comparisons using Tukey HSD test indicated that the mean score for the Non-supportive Aroused public (M = 52.76, SD = 23.56) was significantly different from both the Supportive Inactive public (M = 40.69, SD = 26.03) and the Supportive Aware public (M = 37.36, SD = 23.93). Additionally, post-hoc comparisons using Tukey HSD test indicated that the mean score for the Non-supportive Active public (M = 50.68, SD = 24.80) was significantly different from the Supportive Aware public (M = 37.36, SD = 23.93).

Table 4.21
Current Knowledge Descriptive Statistics by Public Grouping

	n	*M (SD)*	Minimum	Maximum	Range
Non-supportive					
Inactive	19	34.3 (20.65)	3	79	76
Aware	14	39.2 (21.41)	0	70	70
Aroused	66	52.7 (23.56)	0	100	100
Active	77	50.7 (24.80)	1	100	99
Supportive					
Inactive	98	40.7 (26.03)	0	100	100
Aware	76	37.4 (23.93)	0	85	85
Aroused	19	54.3 (22.17)	13	100	87
Active	18	37.9 (20.47)	2	77	75

A one-way between-groups analysis of variance was conducted to explore the differences in needed knowledge among the eight different public groups (Table 4.22). There was a statistically significant difference at the $p < .05$ level in needed knowledge scores for the eight public groups: F (7, 379) = 5.0, p = .000 (Table 4.22). Post-hoc comparisons using Tukey HSD test indicated that the mean needed knowledge score for the Supportive Inactive public (M = 57.51, SD = 24.16) was significantly different from the Non-supportive Aroused public (M = 66.68, SD = 18.15), the Non-supportive Active public (M = 75.18, SD = 23.78), and the Supportive Aware public (M = 68.83, SD = 21.17). Additionally, post-hoc comparisons using Tukey HSD test indicated that the mean needed knowledge score for the Supportive Aware public (M = 68.83, SD = 21.17) was significantly different from Supportive Inactive public (M = 51.51, SD = 24.16).

Table 4.22
Needed Knowledge Descriptive Statistics by Public Grouping

	n	*M (SD)*	Minimum	Maximum	Range
Non-supportive					
Inactive	19	56.4 (21.52)	17	100	83
Aware	14	57.8 (25.87)	5	100	95
Aroused	66	71.9 (24.36)	2	100	98
Active	77	75.9 (23.78)	6	100	94
Supportive					
Inactive	98	57.5 (24.16)	0	100	100
Aware	76	68.8 (21.17)	5	100	95
Aroused	19	66.7 (18.15)	35	100	65
Active	18	66.6 (24.27)	22	100	78

Research Objective 4

RO 4: Define the perceived information gathering capacity of Supportive and Non-supportive millennial publics of genetically modified food.

A one-way between-groups analysis of variance was conducted to explore the differences in information gathering capacity among the eight different public groups. There was not a significant difference at the $p < .05$ level in Ability to Gather All Needed Information scores for the eight publics groups: F (7, 379) = 1.8, p = .09 (Table 4.23). Regardless of significance, the mean scores for Ability to Gather All Needed Information for all eight groups were slightly positive (above 3.0). Additionally, there was not a significant difference between any of the groups at the $p < .05$ level in Ability to Gain Useful Information scores for the eight public groups: F (7, 379) = 1.8, p = .09 (Table 4.24). Regardless of significance, the mean scores for Ability to Gain Useful Information were slightly positive (above 3.0) for all but one group, the Non-supportive Aware public, which was slightly negative (below 3.0) (Table 4.24). Lastly, there was not a significant difference between any of the groups at the $p < .05$ level in Overall Information Gathering Capacity scores for the eight public groups: F (7, 379) = 1.9, p = .07 (Table 4.25). However, the overall Information Gathering Capacity means were slightly positive

(above 3.0) for all but one group, the Non-supportive Aware public, which was slightly negative (below 3.0) (Table 4.25).

Table 4.23
Mean Ability to Gather All Needed Information by Public Grouping

	Inactive	Aware	Aroused	Active
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Non-supportive	3.74 (1.19)	3.07 (1.0)	3.15 (1.30)	3.51 (1.02)
Supportive	3.41 (1.08)	3.68 (.97)	3.32 (1.11)	3.33 (.97)

Note: On a 5-point scale with 1 = lowest and 5 = highest

Table 4.24
Mean Ability to Gain Useful Information by Public Grouping

	Inactive	Aware	Aroused	Active
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Non-supportive	3.47 (1.07)	2.86 (.77)	3.29 (1.11)	3.31 (.96)
Supportive	3.45 (1.00)	3.63 (1.02)	3.32 (.75)	3.06 (.76)

Note: On a 5-point scale with 1 = lowest and 5 = highest

Table 4.25
Mean of Overall Information Gathering Capacity by Public Grouping

	Inactive	Aware	Aroused	Active
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Non-supportive	3.61 (1.07)	2.96 (.82)	3.22 (1.10)	3.41 (.91)
Supportive	3.43 (.92)	3.66 (.91)	3.32 (.82)	3.19 (.95)

Note: On a 5-point scale with 1 = lowest and 5 = highest

Research Objective 5

RO 5: Characterize the information seeking and processing behavior of Supportive and Non-supportive millennial publics of genetically modified food.

Differences in Heuristic Processing by Public Groups

A one-way between-groups analysis of variance was conducted to explore the differences in heuristic processing scores among the eight different public groups. There was a significant difference at the $p < .05$ level in heuristic processing scores among the eight groups; F (7, 379) = 4.9, p = .00. The effect size, calculated using eta squared, was .08. Post-hoc comparisons using

the Tukey HSD test indicated that the mean heuristic processing score for the Non-supportive Inactive public (M = 3.15, SD = .70) was significantly different from the Non-supportive Aroused public (M = 2.53, SD =.71) and the Non-supportive Active public (M = 2.45, SD = .73) (Table 4.26).

Post-hoc comparisons also indicated that the mean heuristic processing score for the Non-supportive Aroused public (M = 2.53, SD = .71) was significantly different from the Supportive Inactive public (M = 2.89, SD = .63) (Table 4.26). Additionally, post-hoc comparisons indicated that the mean heuristic processing score for the Non-supportive Active public (M = 2.45, SD = .73) was significantly different from the Supportive Inactive public (M = 2.89, SD = .63) and the Supportive Aware public (M = 2.80, SD = .67) (Table 4.26).

Table 4.26
Mean Heuristic Processing Scores by Public Grouping

	n	*M*	*SD*
Non-supportive			
Inactive	19	3.15	.70
Aware	14	2.98	.68
Aroused	66	2.53	.71
Active	77	2.45	.73
Supportive			
Inactive	98	2.88	.63
Aware	76	2.80	.67
Aroused	19	2.84	.73
Active	18	2.78	.57

Note: On a 5-point scale with 1 = lowest and 5 = highest

Differences in Systematic Processing by Public Groups

A one-way between-groups analysis of variance was conducted to explore the differences in systematic processing scores among the eight different public groups (Table 4.27). There was a significant difference at the $p < .05$ level in systematic processing scores among the eight groups; F (7, 379) = 4.0, p = .000. The effect size, calculated using eta squared, was .07. Post-hoc comparisons using the Tukey HSD test indicated that the mean systematic processing score

for the Non-supportive Active public ($M = 4.03$, $SD = .65$) was significantly different from the Supportive Inactive public ($M = 2.52$, $SD = .74$) (Table 4.27). None of the other public groups were significant in their mean systematic processing scores.

Table 4.27
Mean Systematic Processing Scores by Public Grouping

	n	*M*	*SD*
Non-supportive			
Inactive	19	3.53	.76
Aware	14	3.60	.52
Aroused	66	3.68	.77
Active	77	4.03	.65
Supportive			
Inactive	98	3.52	.74
Aware	76	3.43	.71
Aroused	19	3.53	.73
Active	18	3.78	.61

Note: On a 5-point scale with 1 = lowest and 5 = highest

Overall Correlations Between Heuristic and Systematic Processing

The relationship between systematic processing (as measured by the systematic processing scale) and heuristic processing (as measured by the heuristic processing scale) was investigated using Pearson product movement correlation coefficient. Preliminary analyses were performed to ensure no violations of the assumptions of normality, linearity, and homoscedasticity (Figure 4.1). There was a slight, negative correlation between the two variables, $r = -.201$, $n = 387$, $p < .01$, with higher levels of systematic processing correlated with lower levels of heuristic processing.

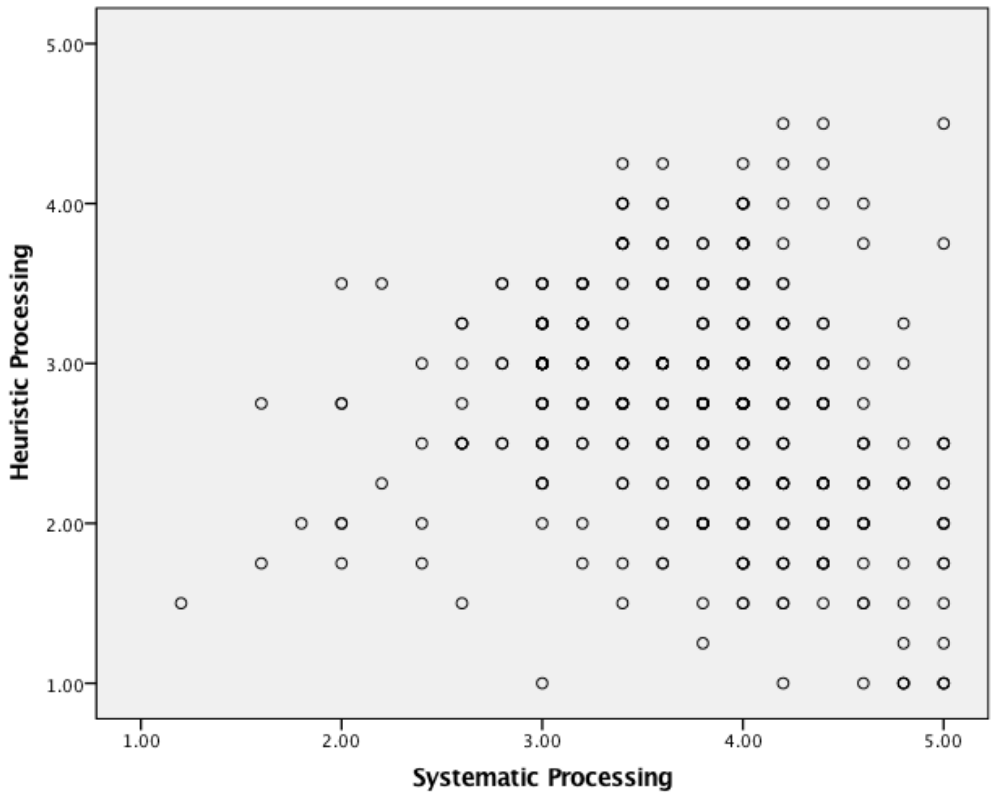

Figure 4.1
Scatterplot of Systematic and Heuristic Processing Correlation

Correlations Between Heuristic and Systematic Processing by Public Grouping

The relationship between systematic processing (as measured by the systematic processing scale) and heuristic processing (as measured by the heuristic processing scale) among each of the eight public groups was investigated using Pearson product movement correlation coefficient. Preliminary analyses were performed to ensure no violations of the assumptions of normality, linearity, and homoscedasticity. There was no correlation between the two variables among the Non-supportive Inactive public, the Non-supportive Aware public, the Non-supportive Aroused public, the Supportive Inactive public, and the Supportive Aroused public (Table 4.26). Among the Non-supportive Active public, there was a moderate negative correlation between the two variables, $r = -.480$, $n = 387$, $p < .01$, with higher levels of systematic processing correlated with lower levels of heuristic processing (Table 4.28). Among

the Supportive Aware public, there was a slight negative correlation between the two variables, r = -.238, n = 387, p < .05, with higher levels of systematic processing correlated with lower levels of heuristic processing (Table 4.28). Among the Supportive Active public, there was a strong negative correlation between the two variables, r = -.595, n = 387, p < .01, with higher levels of systematic processing correlated with lower levels of heuristic processing (Table 4.28).

Table 4.28
Correlation Between Heuristic and Systematic Processing by Public Grouping

	n	*r*	*p*	Strength
Non-supportive				
Inactive	19	-.242	.318	Weak
Aware	14	.088	.766	-
Aroused	66	-.126	.314	-
Active	77	-.408	.000	Moderate
Supportive				
Inactive	98	.064	.529	-
Aware	76	-.238	.039	Weak
Aroused	19	.436	.062	-
Active	18	-.595	.009	Strong

Note: All correlations were negative

Differences in Information Avoidance by Public Grouping

A one-way between-groups analysis of variance was conducted to explore the differences in information avoidance scores among the eight different public groups. There was a significant difference at the p < .05 level in information avoidance scores among the eight groups; F (7, 379) = 8.7, p = .000. The effect size, calculated using eta squared, was .14. Post-hoc comparisons using the Tukey HSD test indicated that the mean information avoidance score for the Non-supportive Inactive public (M = 2.83, SD = .84) was significantly different from the Non-supportive Aroused public (M = 2.15, SD =.87) (Table 4.29). Post-hoc comparisons using the Tukey HSD test also indicated that the mean information avoidance score for the Non-supportive Active public (M = 1.76, SD = .76) was significantly different from the Non-supportive Inactive public (M = 2.52, SD =.74), the Non-supportive Aware public (M = 2.57, SD = .75), the

Supportive Inactive public (*M* = 2.47, *SD* = .75), the Supportive Aware public (*M* = 2.36, *SD* = .73), the Supportive Aroused public (*M* = 2.63, *SD* = .64), and the Supportive Active public (*M* = 2.52, *SD* = .74) (Table 4.29).

Table 4.29
Mean Information Avoidance Scores by Public Grouping

	n	*M*	*SD*
Non-supportive			
Inactive	19	2.83	.84
Aware	14	2.57	.74
Aroused	66	2.15	.87
Active	77	1.76	.77
Supportive			
Inactive	98	2.47	.75
Aware	76	2.36	.73
Aroused	19	2.63	.64
Active	18	2.52	.72

Note: On a 5-point scale with 1 = lowest and 5 = highest

Differences in Information Seeking by Public Grouping

A one-way between-groups analysis of variance was conducted to explore the differences in information seeking scores among the eight different public groups. There was a significant difference at the $p < .05$ level in information seeking scores among the eight groups; F (7, 379) = 3.8, $p = .000$. The effect size, calculated using eta squared, was .07. Post-hoc comparisons using the Tukey HSD test indicated that the mean information seeking score for the Non-supportive Active public (*M* = 3.94, *SD* = .86) was significantly different from the Supportive Inactive public (*M* = 3.35, *SD* =.84) and the Supportive Aware public (*M* = 3.43, *SD* =.71) (Table 4.30). None of the other public groups were significantly different in their mean information seeking scores.

Table 4.30
Mean Information Seeking Scores by Public Grouping

	n	*M*	*SD*
Non-supportive			
Inactive	19	3.37	.97
Aware	14	3.43	.70
Aroused	66	3.58	.97
Active	77	3.94	.86
Supportive			
Inactive	98	3.35	.84
Aware	76	3.43	.71
Aroused	19	3.29	.92
Active	18	3.61	.76

Note: On a 5-point scale with 1 = lowest and 5 = highest

Overall Correlations Between Information Seeking and Avoidance

The relationship between active information seeking and information avoidance was investigated using Pearson product movement correlation coefficient. Preliminary analyses were performed to ensure no violations of the assumptions of normality, linearity, and homoscedasticity. There was a strong, negative correlation between the two variables, $r = -.555$, $n = 387$, $p < .01$, with higher levels of active information seeking correlated with lower levels of information avoidance.

Correlations Between Active Information Seeking and Information Avoidance by Public Grouping

The relationship between active information seeking and information avoidance among the Non-supportive Inactive public was investigated using Pearson product movement correlation coefficient. Preliminary analyses were performed to ensure no violations of the assumptions of normality, linearity, and homoscedasticity.

Among the Non-supportive Inactive public, there was a strong negative correlation between the two variables, $r = -.586$, $n = 387$, $p < .01$, with higher levels of active information

seeking correlated with lower levels of information avoidance (Table 4.31). Among the Non-supportive Aware public, there was a strong negative correlation between the two variables, $r = -.822$, $n = 387$, $p < .01$, with higher levels of active information seeking correlated with lower levels of information avoidance (Table 4.31). Among the Non-supportive Aroused public, there was a strong negative correlation between the two variables, $r = -.586$, $n = 387$, $p < .01$, with higher levels of active information seeking correlated with lower levels of information avoidance (Table 4.31). Among the Non-supportive Active public, there was a strong negative correlation between the two variables, $r = -.704$, $n = 387$, $p < .01$, with higher levels of active information seeking correlated with lower levels of information avoidance (Table 4.31).

Among the Supportive Inactive public, there was a moderate negative correlation between the two variables, $r = -.392$, $n = 387$, $p < .01$, with higher levels of active information seeking correlated with lower levels of information avoidance (Table 4.31). Among the Supportive Aware public, there was a strong negative correlation between the two variables, $r = -.546$, $n = 387$, $p < .01$, with higher levels of active information seeking correlated with lower levels of information avoidance (Table 4.31). Among the Supportive Aroused public, there was no correlation between the two variables (Table 4.31). Among the Supportive Active public, there was a strong negative correlation between the two variables, $r = -.557$, $n = 387$, $p < .01$, with higher levels of active information seeking correlated with lower levels of information avoidance (Table 4.31).

Table 4.31

Correlation Between Active Information Seeking and Information Avoidance by Public Grouping

	n	*r*	*p*	Strength
Non-supportive				
Inactive	19	-.586	.008	Strong
Aware	14	-.822	.000	Strong
Aroused	66	-.540	.000	Strong
Active	77	-.704	.000	Strong
Supportive				
Inactive	98	-.392	.000	Moderate
Aware	76	-.546	.000	Strong
Aroused	19	.066	.789	-
Active	18	-.557	.016	Strong

Note: All correlations were negative

Correlation Between Age and Information Seeking and Processing Behaviors

The relationship between age and heuristic processing was investigated using Pearson-product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. However, there was no correlation found between the two variables.

The relationship between age and systematic processing was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. There was a slight positive correlation between the two variables, $r = -.12$, $n = 387$, $p < .05$, with higher levels of age correlated with lower levels of systematic processing.

The relationship between age and information avoidance was investigated using Pearson-product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. There was a slight negative correlation between the two variables, $r = -.14$, $n = 387$, $p < .05$, with higher levels of age correlated with low levels of information avoidance.

The relationship between age and active information seeking was investigated using Pearson-product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. However, there was no correlation found between the two variables.

Summary of Analysis

Little variation was found among the eight groups in individual characteristics. However, it is interesting to note that as issue involvement increased in the Non-supportive groups, the range of income increased as well and reached into the higher brackets. Conversely, as issue involvement decreased in Supportive groups, the range of income increased and reached into the higher income brackets. Additionally, higher levels of age were correlated with higher levels of systematic information processing and lower levels of information avoidance.

One-way analyses of variances revealed no statistical differences among the eight public groups in Media Distort mean scores, Media Processing Cues mean scores, or Overall Channel Belief mean scores. However, the mean score of all eight public groups were positive (above 3.0) in all three scores.

The majority of respondents in all eight groups had a knowledge gap to some extent. A one-way analysis of variance revealed that the Supportive Aware public were significantly higher than the Supportive Inactive public in mean knowledge gap scores. However, no other significant differences were found among the eight groups in mean knowledge gap scores.

A one-way analysis of variance also revealed there were no significant differences among the eight public groups in their mean Ability to Gather All Needed Information, their mean Ability to Gain Useful Information, or their mean Overall Channel Belief score.

One-way analyses of variances revealed some differences among the eight public groups

in heuristic and systematic processing. A slight negative correlation was found between overall heuristic and systematic processing. Some negative correlations of varying strengths also were found between heuristic and systematic processing among some of the public groups. A one-way analysis of variance also revealed some differences among the eight public groups in information avoidance and active information seeking. A strong negative correlation was found between overall information avoidance and active information seeking. Additionally, negative correlations between information avoidance and active information seeking of varying strengths were found among most of the public groups.

The next chapter will provide further discussion of these results. It also contains general conclusions, implications of this study, and recommendations.

Chapter 5 - Discussion

How publics seek and process information about controversial topics is important for communicators to understand in order to strategize communication efforts. Millennial publics are especially important to target considering the size of their population group, purchasing power, and social influence (Jang et al., 2011; Morton, 2002; O'Donnell, 2006; Sullivan & Heitmeyer, 2008; Taylor & Cosenza, 2002). The purpose of this study was to identify Supportive and Non-supportive millennial publics and characterize how these millennial publics will seek and process risk information about genetically modified food. The results of this study can be used to help communicators better strategize communication efforts with different millennial public groups to hopefully trigger more systematic information processing and active information seeking, which hopefully would lead to more stable opinions and perspectives with less emotional influence. The following research objectives guided this study:

RO 1: Identify the individual characteristics of Supportive and Non-supportive millennial publics of genetically modified food.

RO 2: Examine relevant channel beliefs of Supportive and Non-supportive millennial publics of genetically modified food.

RO 3: Identify and describe the information gap of Supportive and Non-supportive millennial publics of genetically modified food.

RO 4: Define the perceived information gathering capacity of Supportive and Non-supportive millennial publics of genetically modified food.

RO 5: Characterize the information seeking and processing behavior of Supportive and Non-supportive millennial publics of genetically modified food.

Publics

There were eight different publics that respondents could be sorted into based on their level of support, level of issue involvement, and level of knowledge: Non-supportive Inactive, Non-supportive Aware, Non-supportive Aroused, Non-supportive Active, Supportive Inactive, Supportive Aware, Supportive Aroused, and Supportive Active. Of the Non-supportive publics, 37.5% were sorted into the Aroused category and 43.8% were sorted into the Active category. Of the Supportive public, 46.4% were sorted into the Inactive category and 36% were sorted into the aware category. The majority of the Non-supportive public had high issue involvement scores while the majority of the Supportive public had low issue involvement scores (Table 4.8). It is also important to note that the largest Non-supportive public category was Active and the largest Supportive public category was Inactive. Farmers have had a high adoption of GM technology and have typically looked at the facts behind GM food. However, resistant consumers tend to think more emotionally in terms of their food choices. The same may be happening in this situation with Supportive publics thinking about the risks of GM food from a factual standpoint and emotions may be influencing Non-supportive publics or perhaps the Supportive publics may be more likely to focus on the benefits of the technology while Non-supportive publics may be more likely to focus on the risks.

Research Objective 1

RO 1: Identify the individual characteristics of Supportive and Non-supportive millennial publics of genetically modified food

The majority of respondents in all four Non-supportive public groups were female. Of the Supportive groups, three of the four publics (Inactive, Aware, and Active) were a majority male. Only the Supportive Aroused public had a higher percentage of female respondents. This aligns

with previous research that men generally have more positive attitudes towards GM science than women (Ling, Santos, & Poletti, 2013; Moerbeek & Casimir, 2005). This may be because women take on the traditional role of grocery shoppers, therefore have more control over what children in family units eat and may be more concerned about what their children eat than their male counterparts. They may also be more health conscious, more concerned about the perceived risks of GM food and the perceived possible effects of eating it. Additionally, women have been found to be more risk averse than men and this may also influence their greater aversion to GM food (Neelakantan, 2010; Bellows, Alcaraz V., & Hallman, 2010).

Age is typically a considered demographic factor in the demographic portion of the Risk Information Seeking and Processing Model. However, a one-way analysis of variance found no major differences in age among the eight public groups. Since the study was limited to millennials, this was to be expected. Perhaps significant differences in age among publics may be found if future research looked at different groups or a broader age range as older individuals have been found to be less risk tolerant than younger generations (Dohmen et al., 2005; Ellis & Tucker, 2009).

The majority of respondents in all eight groups were Caucasian. The least reported ethnicities varied among the publics and included Latino(a), African American, Asian, and Hawaiian. This was also expected as the survey collection was initially weighted to be representative of U.S. census data. However, because a large portion of respondents were removed due to reverse coded attention filter questions, the final sample differed slightly in ethnicity from initial collection.

The Non-supportive Active public was the only group that had a majority of respondents who had children living in the home. This group may be more concerned about the possible

perceived risk of their children consuming GM food and, as a result, may be prone to actively avoiding consumption of GM food and/or may pass on their opinions to their children. The Non-supportive Aroused public had an even amount of respondents who did and did not have children. The fact that they have children may be the reason for many of this group's negative and active stance against GM food. A one-way ANOVA did not reveal any significant differences in the number of children among the eight public groups. This is not surprising due to the fact that millennials are a relatively young consumer group. They are attending college in greater numbers than previous generations, are taking on extensive student loan debt to do so (Fry & Parker, 2012), and are delaying marriage and parenthood (Arnett, 2004; Livingston, 2017; Taylor & Keeter, 2010). As a whole, this generation is still in the beginning stages of child production and while they are responsible for the majority of births in the United States, they may be having less children than the generations before them.

When it comes to political affiliation, three of the four Non-supportive public groups (Inactive, Aware, and Aroused) had the highest percentage of respondents within each public identify as Liberal. Only the Non-supportive Active public had the highest percentage of respondents who identify as Conservative. For the Supportive publics, Aware and Aroused had the greatest percentage of their respondents identify as Liberal. The Supportive Inactive public most frequently reported Conservative. While the Supportive Active public had an equal number of respondents for Liberal, Conservative, and Other. Past research indicates that roughly half of millennials do not identify as liberal or conservative, but have voted heavily liberal in the 2008 and 2012 U.S. presidential elections (Pew Research Center, 2014). Additionally, they are the only generation where liberals are not significantly outnumbered by conservatives (Pew Research Center, 2014). In general, Conservative Republicans have been found to be more

supportive of genetically modified food than Liberals (Costa-Font, Mossialos, & Rudisill, 2008). However, the findings of this study do not support that. As more millennials become of voting age and become more politically active, they may start shifting away from the two party system or may be more likely to vote across party lines when it comes to specific issues such as GM science.

Three of the four Non-supportive public groups (Inactive, Aware, and Active) had at least a high school diploma. Of the Supportive public, only in the Active public did all respondents have at least a high school diploma. This suggests that overall, Non-supportive publics may be slightly more educated. However, the percentage of respondents who received a 2-year college degree or higher is roughly the same among the eight groups. This percentage of millennials without at least a high school diploma or a bachelor's degree is unusual given the fact that millennials are attending college at a greater rate than any prior generation (Fry & Parker, 2012). It was anticipated that a larger percentage would have at least a bachelor's degree and that very few would have less than a high school diploma.

In all eight public groups, the income level of the majority of respondents was $50,000 to $74,999 or less. Of the eight groups, the most frequently reported income level was lowest for the Supportive Inactive public ($25,000 or less). Some studies have shown that extremely poor people are less hostile to genetically modified food (Baker & Burnham, 200; McCluskey et al., 2003; Pachico & Wolf, 2002). However, others have found no correlation between income level and support of genetically modified food (Antonopoulou, Papadas, & Targoutzidis, 2009). This study found that generally, lower salaries were more broadly distributed across public groups, regardless of supportiveness or non-supportiveness. However, for the Non-supportive public, as level of issue involvement increased, salary increased as well. For supportive publics, the

opposite occurred and as level of issue involvement decreased, salary levels increased. Suggesting that generally, higher income individuals who do not support the technology are also more active in their efforts and wealthy people who support the technology are less active in their efforts. This could possibly be that wealthy Non-supportive publics have the means to buy more expensive non-genetically modified food, while wealthy supportive publics have the means to avoid genetically modified food, but do not care enough about the issue because they could more easily afford non-genetically modified food if genetically modified crops were banned.

Research Objective 2

RO 2: Examine relevant channel beliefs of Supportive and Non-supportive millennial publics of genetically modified food

A one-way ANOVA revealed no significant differences among the eight public groups in Media Distort, Media Processing Cues, and Overall Channel Beliefs, suggesting that millennials may be homogenous in their opinions toward the media. In addition, the mean scores for all eight groups in all three items were slightly positive (above 3.0), suggesting that overall, millennials believe that the media is slightly biased and that when the media uses statistics and the same information appears in multiple places, millennials may perceive the information as slightly more credible. Prior research has shown that millennials utilize Google and human sources as the first sources they use for quick searches (Connaway, Radford, Dickey, Williams, & Confer, 2008). Younger millennials also tend to most frequently consult their parents, while older millennials tend to most frequently consult friends (Connaway, Radford, Dickey, Williams, & Confer, 2008). Additionally, millennials have tended to increasingly rely on social media as a media source (Gangadharbatla, Bright, Logan, 2014). While this study focused on the media in general rather than specific types of media sources, it shows that during information searches

about the risk of genetically modified food, millennials tend to view the media sources as slightly biased, but still slightly useful. This may have been influenced by the recent political climate and accusation of the news media as fake news.

Research Objective 3

RO 3: Identify and describe the information gap of Supportive and Non-supportive millennial publics of genetically modified food

In all eight public groups, the majority of respondents reported a knowledge deficit, meaning that to some extent, the majority of millennials do not have enough current knowledge to make an informed decision about the risks of genetically modified food. Additionally, a one-way ANOVA was calculated and a significant difference in knowledge gap scores were found among the Supportive Aware and the Supportive Inactive publics. With the Supportive Aware public having a larger mean gap (M = 31.47, SD = 32.87) than the Supportive Inactive public (M = 16.82, SD = 24.11). However, none of the other groups significantly differed in their knowledge gap scores. The larger mean knowledge gap of the Supportive Aware public compared to the Supportive Inactive public shows that the Supportive Aware public may be more cognizant of their lack of knowledge while the Supportive Inactive is less aware of it.

A one-way ANOVA was calculated and significant differences in current knowledge scores were found. The Non-supportive Aroused public (M = 52.76, SD = 23.56) had significantly higher mean current knowledge scores than both the Supportive Inactive public (M = 40.69, SD = 26.03) and the Supportive Aware public (M = 37.36, SD = 23.93). Additionally, the Non-supportive Active public (M = 50.68, SD = 24.80) had significantly higher mean current knowledge scores than the Supportive Aware public (M = 37.36, SD = 23.93).

A one-way ANOVA was calculated and significant differences in needed knowledge

scores were found. The Non-supportive Active public (*SD* = 75.18, *SD* = 23.78) had a significantly higher mean needed knowledge score than the Non-supportive Inactive public (*SD* = 56.42, *SD* = 21.52). Also, the Supportive Inactive public had a significantly lower mean needed knowledge score than the Non-supportive Aroused public (*SD* = 71.88, *SD* = 24.36), the Non-supportive Active public (*SD* = 75.18, *SD* = 23.78), and the Supportive Aware public (*SD* = 68.83, *SD* = 21.17).

In terms of risk information about genetically modified food, the majority of every group had a knowledge deficit. However, those in the Supportive Aware public (Low Issue Involvement/High Knowledge) had a greater mean knowledge gap score than the Supportive Inactive public (Low Issue Involvement/Low Knowledge), meaning that the Supportive Aware public had a higher sufficiency threshold than the Supportive Inactive public and could possibly be more inclined to systematically process information (Chaiken, Liberman, & Eagly, 1989; Eagly & Chaiken, 1993; Jain & Maheswaran, 2000). Gap size is also correlated to seeking additional information through multiple sources, regardless of processing style (Eagly & Chaiken, 1993). The significant differences in current knowledge scores may be related to information gathering capacity scores. In needed knowledge scores, the Inactive public was significantly lower than several other publics regardless of level of support. Regardless of significance, means comparisons show that the Inactive public did have the lowest mean needed knowledge scores. This is not surprising considering this group is categorized as having low issue involvement and therefore possibly less desire to seek information. Overall, the data does not show a trend in knowledge gap, current knowledge, or needed knowledge in relation to the eight public groups. This indicates that potentially, knowledge may not play a factor in influencing an individual's level of support or issue involvement.

Research Objective 4

RO 4: Define the perceived information gathering capacity of Supportive and Non-supportive millennial publics of genetically modified food

No statistical difference was found among the eight different public groups in perceived information gathering scores. This suggests that millennials are homogenous in their perceived Ability To Gather All Needed Information and in their perceived Ability To Gather Useful Information about the risks of genetically modified food. The mean scores for Ability To Gather All Needed Information for all eight groups were slightly positive, suggesting that millennials may believe that they can gather all the information they need to make an informed decision about the risks of genetically modified food (Table 4.19).

Additionally, the mean scores for Ability to Gain Useful Information were slightly positive for most of the groups, excluding the Non-supportive Aware public, which was slightly negative (Table 4.20). This suggests that the majority of millennial publics may believe they are able to gain useful information when making decisions about the risks of genetically modified food.

The overall Information Gathering Capacity means were slightly positive for most of the groups, excluding the Non-supportive Aware public, which was slightly negative (Table 4.20). This suggests that the majority of millennials may not perceive many barriers to obtaining information about the risks of genetically modified food. It may be the lack of barriers that influences the millennial perception that they can achieve all needed information.

These findings align with past research showing that millennials more frequently use the Internet than older generations and therefore, in the age of smart phones, can access information quickly and easily (Connaway, Radford, Dickey, Williams, & Confer, 2008; Gangadharbatla,

Bright, & Logan, 2014.), meaning that if they want the information, they can easily find it. However, this does not mean that the information they find is necessarily accurate. Additionally, the slightly negative overall Information Gathering Capacity mean for the Non-supportive Aware public may be perceiving barriers to collecting useful information and could possibly be preventing individuals in this group from moving beyond the Aware public group into the Active public group. Additionally, they may believe that the information presented to them is not accurate due to a mistrust of biotech companies creating GM food varieties. This distrust may lead them to believe that information is being withheld, creating a barrier to accessing information.

Research Objective 5

RO 5: Characterize the information seeking and processing behavior of Supportive and Non-supportive millennial publics of genetically modified food

A slight negative correlation was found between systematic and heuristic processing among the overall respondents with a higher level of systematic processing correlated with lower level of heuristic processing. Correlations were then assessed between systematic and heuristic processing and examined within each of the eight public groups. Within a majority of the publics, there was no correlation between systematic and heuristic processing. However, Non-supportive Active public reported a moderate correlation, the Supportive Aware public had a slight correlation, and the Supportive Active public had a strong correlation between the two variables. It is important to note that three of the four publics with high knowledge had a negative correlation to some degree between systematic and heuristic processing. Therefore, there may be some influence of an individual's level of knowledge on the strength of the negative correlation between systematic and heuristic processing and that high levels of

knowledge may drive single mode processing either heuristically or systematically. While those with low levels of issue involvement may be processing information heuristically and systematically simultaneously as proposed by Eagly and Chaiken (1993) instead of exclusively, these individuals are relying on a sole processing strategy and may bounce back and forth. Additionally, it may be that low level issue involvement individuals may have a more stable opinion about certain aspects/information of GM food that they have processed systematically than other aspects that they have processed heuristically, meaning that instead of processing the information about the topic as a whole one way or the other, they have processing specific information about GM food in different ways.

This study also explored the relationship between active information seeking and information avoidance among overall respondents, with a strong negative correlation found. Among the overall respondents, higher levels of active information seeking were correlated with lower levels of information avoidance. Correlations were then assessed between active information seeking and information avoidance and examined within each of the eight public groups. Of the eight public groups, the Supportive Aroused public group was the only one that did not show a correlation between active information seeking and information avoidance. The Supportive Inactive public had a moderate correlation between active information seeking and information avoidance with higher levels of active information seeking correlated with lower levels of information avoidance. The other six groups all showed a strong negative correlation between active information seeking and information avoidance. This suggests that most millennials are either actively seeking out information or actively avoiding it. However, this also means that millennials could be actively avoiding it while still passively seeking information at the same time. This is important because if a public is actively avoiding information, it makes it

difficult to get new information to them.

One-way analyses of variances were run to see if there were significant differences among the eight public groups for heuristic processing, systematic processing, active information seeking, and information avoidance. The Non-supportive Inactive public had a significantly higher mean heuristic processing score than both Non-supportive Aroused and Non-supportive Active public. The Supportive Inactive public had a significantly higher mean heuristic processing score from both Non-supportive Aroused public and Non-supportive Active public. The Supportive Aware public had a significantly higher mean heuristic processing score than the Non-supportive Active public. Regardless of significance, it is important to note that the Non-supportive Inactive public had the highest mean heuristic processing score and the only group with a mean score above a 3.0, meaning they were the only group that was positive (above 3.0) and that they're more likely to process information heuristically. Additionally, this means that they may be less stable in their opinions and more open to change.

Post-hoc comparisons showed that, in terms of mean systematic processing scores, the only significant finding was that the Non-supportive Active public had a significantly higher systematic processing score. None of the other publics were significantly different in their mean systematic processing scores. Regardless of significance, it is important to note that Non-supportive Active public had the highest mean systematic processing score followed by Non-supportive Active public which had the second highest mean systematic processing score, meaning that regardless of significance, the Active publics are more likely to systematically process information and it will be tougher to sway the opinions of individuals in these two groups than any of the others.

Post-hoc comparisons also showed that the Non-supportive Inactive public had a

significantly higher mean information avoidance score than the Non-supportive Aroused public. The Non-supportive Active public also had a statistically significant lower information avoidance mean score than the Non-supportive Inactive, the Non-supportive Aware, the Supportive Inactive, the Supportive Aware, the Supportive Aroused, and the Supportive Active publics. The one public group whose mean information avoidance score did not significantly differ from that of the Non-supportive Active public was the Non-supportive Aroused public, who shares a high level of issue involvement and nonsupport for the technology with the Non-supportive Active public. Regardless of significance, the Non-supportive Active public (those with high issue involvement and high knowledge) had a lower mean information avoidance score than the rest of the seven groups and the Non-supportive Inactive public had the highest mean information avoidance score, suggesting that the Non-supportive Active public are less likely to avoid information they encounter about genetically modified food than the other seven groups. While the Non-supportive Inactive public is the most likely to avoid new information. This conflicts with research that has found that individuals with low avoidance strategies and analytic processing styles perceive less food risk than others (Leikasa, Lindemana, Roininenb, & Lähteenmäkib, 2006). However, the Non-supportive Active public, whose individuals are informed about genetically modified food, had the lowest information avoidance score and the highest systematic processing score and may not perceive more risks, but in fact just simply not approve of genetic modification technology applied to food (Allum et al., 2008; Moerbeek & Casimir, 2005). In fact, it has been shown that increased knowledge does not always lead to support and can lead to increased opposition (Jelsoe, 1997; Madsen et al., 2003).

In terms of information seeking, the Non-supportive Active public had a significantly higher mean information seeking score than both the Supportive Inactive and the Supportive

Aware. None of the other public groups were significantly different in their mean information seeking scores. Regardless of significance, the Non-supportive Active public had the highest mean active information seeking score, followed by Supportive Active public who had the second highest mean active information seeking score. The supportive Inactive public had the lowest mean active information seeking score, followed closely by the Non-supportive Inactive public with the second lowest active information seeking score.

A correlation was found between age and systematic processing and information avoidance. Older millennials were found to be more likely to systematically process information and less likely to avoid new information. However, no correlation was found between age and heuristic processing and active information seeking. This may be due to the fact that older millennials have experienced more hazards and risks, causing them to be more cautious when it comes to risk and more critically analyze information about a risk. Additionally, the greater life experiences of older millennials may lead them to not necessarily more actively seek new information, but not be afraid of encountering it. Past studies have found mixed results concerning effects of age on risk perceptions (Ellis & Tucker, 2009). Some studies have found older individuals to have more confidence in the safety of meat products (Smith & Riethmuller, 2000) and less concerned about the risk of antibiotics in meat and pesticides in food (Nayga, 1996). However, other studies have found older individuals to have greater risk perceptions than younger individuals (Dosman, Adamowicz, & Hrudey, 2001; Knight & Warland; 2005; Williams & Hammitt, 2001).

Conclusions

The majority of Non-supportive publics had a high level of issue involvement, meaning they were very active in advocacy and the issue as a whole, and the majority of supportive

publics had low issue involvement, meaning they are not active in the issue of GM food. Additionally, this study found that age can be indicative of systematic processing and information avoidance with older millennials more likely to systematically process information and less likely to avoid information about genetically modified food. This study's findings also support past findings that men are more accepting of the technology than women. This study also found income to be related to level of issue involvement with wealthier Non-supportive publics having higher levels of issue involvement and wealthier Supportive publics having lower levels of issue involvement.

Millennials believe media sources to be slightly biased, but also still useful. Additionally, all millennial groups were slightly positive in their Ability to Gather all Needed Information, which may be due to their ease of access to the Internet. Additionally, they do not perceive a lot of barriers to gathering useful information as they tend to gravitate towards google and social media, which are easily accessible via smartphones.

All millennial publics had a majority of respondents with a perceived knowledge deficit, meaning they needed more knowledge than they currently had. Current knowledge varied across the groups. Non-supportive publics with high issue involvement reported higher mean current knowledge scores. However, supportive publics did not see the same trend. In fact, those in the Supportive Aware public had the highest mean current knowledge score when in fact they were coded as having low knowledge, meaning some genetically modified food advocates may not exactly be informed about the science of the technology.

The active information seeking and systematic processing behaviors observed in this study align with past research showing active information seeking to be linked to more systematic information processing (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006). Higher

levels of heuristic information processing were negatively correlated with lower levels of systematic processing. Additionally, lower levels of information avoidance were negatively correlated with higher levels of active information seeking. The Non-supportive Active public, whose individuals contained high knowledge and high issue involvement, but did not approve of GM food, had the highest mean active information seeking and systematic processing score and lowest mean information avoidance and heuristic processing scores. This supports past findings that scientific knowledge does not necessarily equate to acceptance of the technology and can often lead to opposition (Jelsoe, 1997, Madsen et al., 2003).

Recommendations for Practitioners

Since the majority of Supportive publics were found to have low issue involvement, communication practitioners should focus on increasing issue involvement among this group to move them to become more active in the issue and more influential in raising support for the technology. For some stakeholders, this can possibly be done by simply providing them with more information (Rawlins, 2006). However, for other individuals, it may involve making the issue of GM food important and personally relevant. When communicating with the Non-supportive Active public, communication practitioners should focus on addressing opinion leaders of the public segment and encourage open dialogue (Hallahan, 2002). Additionally, practitioners should work to understand the source of arousal for the Non-supportive Arouse public and frame messages related to their concerns (Hallahan, 2000). For the Supportive Inactive public, communication practitioners should be proactive in communicating with this public and provide motivation for them to increase their knowledge about genetically modified food (Hallahan, 2000). Finally, communication practitioners should encourage members of the Supportive Aware public to act as influencers and supply them with additional information

(Hallahan, 2000). For example, providing individuals of this public with messages and information about the benefits of GM technology to farmers, consumers, and the environment. However, they should be careful to not overwhelm them with information and unintentionally increase opposition for the technology. Additionally, communication practitioners should focus on increasing the knowledge of wealthier supportive publics and encourage them to be more active on the issue.

Communication practitioners also should keep in mind that millennials may perceive media channels as slightly biased, but may be more likely to believe information and may perceive it as more useful if it appears in multiple media channels or information sources. Therefore, practitioners should communicate through multiple channels and multiple news sources when communicating about the risks of a product or technology. For example, disseminating information via multiple social media platforms since millennials often use social media as an information source (Gangadharbatla, Bright, & Logan, 2014).

Communication practitioners may have difficulty when communicating to and attempting to sway Non-supportive Active publics because, while they are more likely to seek out information and less likely to avoid information, their opinions are probably more stable and less likely to change than other publics.

Recommendations for Future Research

Future research should focus on exploring the possible relationship between the respondent's level of issue involvement and perceived hazard characteristics, hazard experiences, and the type of risk respondents associate with genetically modified food (risk to self, other, the environment, etc.). Additionally, future research should examine the correlation between level of support and systematic and heuristic processing to see if non-supportive publics are processing

information about the technology more analytically or more emotionally. This research could help communicators better strategize communication efforts with non-supportive publics to increase their support of the technology. Future research should also delve into examining the motivational triggers for Inactive publics and the source of arousal for Non-supportive Aroused publics. It would be beneficial to understand what triggers Inactive publics to become more active on the issue. Additionally, identifying the source of arousal for Non-supportive Aroused publics is beneficial because communicators can learn how to avoid pushing this public to become more active on the issue. Marital status was not collected in this study, but should be examined for level of support and possible differences in information seeking and processing as past research has found marital status as an influencer of risk tolerance (Hartog, Ferrer-i-Carbonell, & Jonker, 2002; Yao & Hanna, 2005).

The relationship between self-reported current knowledge and information gathering capacity should be examined in future research efforts. Individuals with greater knowledge may perceive less barriers to gathering information. Additionally, while this study examined general media channel beliefs, future research should examine further what sources millennials trust and find useful when it comes to risk information about GM foods. For example, do they trust food bloggers, scientific articles, friends, or doctors? Knowing what types of sources millennials get their information from can improve information dissemination. Future analyses should examine the possible relationship between knowledge gap and systematic processing and information avoidance. Do those that perceive larger knowledge gaps process information heuristically or are they more likely to avoid new information? Finally, future research should examine if non-supporters of genetically modified food disapprove of genetic modification altogether, or just when applied to food production or certain aspects of food production. This study failed to assess

where and how millennials are accessing information about genetically modified food and future research should look at assessing this and the accuracy of the information they are accessing.

Future research using the relevant channel belief scale should revise and modify it to increase the reliability of the scale. Additionally, a large portion of respondents were found to be randomly answering questions. Future research may want to avoid using paid respondents through a survey company as they may not be sufficiently motivated to answer honestly. Additionally, different filter questions without reverse coding may be more accurate in future studies in finding and removing respondents who randomly answered questions.

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Appendix A - List of Definitions

Affective Response- the general psychological state of an individual, including but not limited to emotions and mood, within a given situation

Channel Beliefs- an individual's perceptions of information sources, such as the media, that can affect an individual's information seeking behaviors employed to provide the individual with information about the risk

Citrus Greening- a bacterial disease that affects citrus trees by slowly starving the tree of nutrients and reducing the quality and quantity of fruit produced

Genetic Modification- the manipulation of an organism's genetic makeup through the insertion of genes of one organism into another

Heuristic Processing- superficial and more instinctual processing of information

Informational Subjective Norms- felt pressure from others to be knowledgeable of a topic

Information Avoidance- the active evasion of new information about a topic in order to reduce or cease exposure to new information about the topic

Information Seeking- the search for information about a topic that can range from more passive seeking, where the individual stumbles across information, but is not purposively looking for it, to more active seeking where the individual purposively looks for information about the topic

Information Sufficiency- having enough information to make a decision makes the individual "information sufficient" or even information surplus while not having enough information leads to an information deficiency

Issue Involvement- the amount of care an individual has about a topic that causes them to be more or less active in the issue

Knowledge- the amount of information a person has about a specific issue

Relevant Hazard Experiences- past experiences with a specific risk associated with an issue that influences how individuals will act in the future

Perceived Hazard Characteristics- perceptions about the risks associated with a specific topic

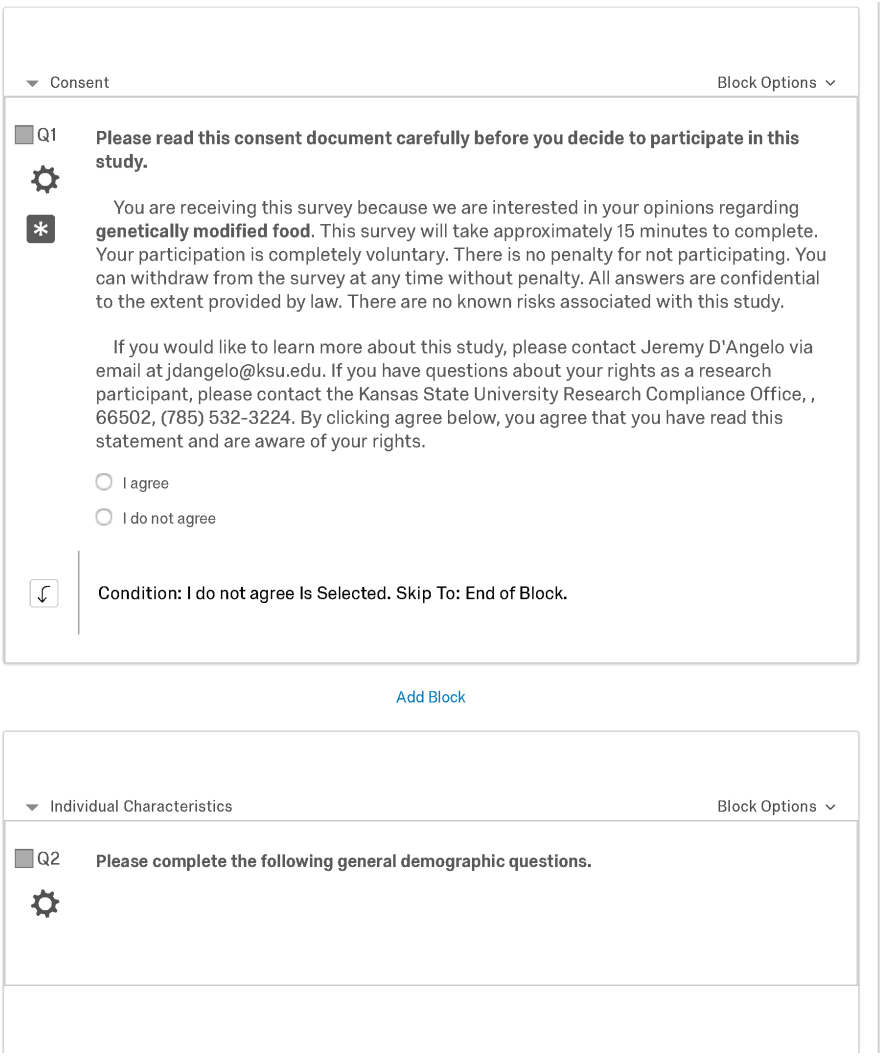
Perceived Information Gathering Capacity- perceived ability to gather all needed and useful information about a topic in order to make a decision

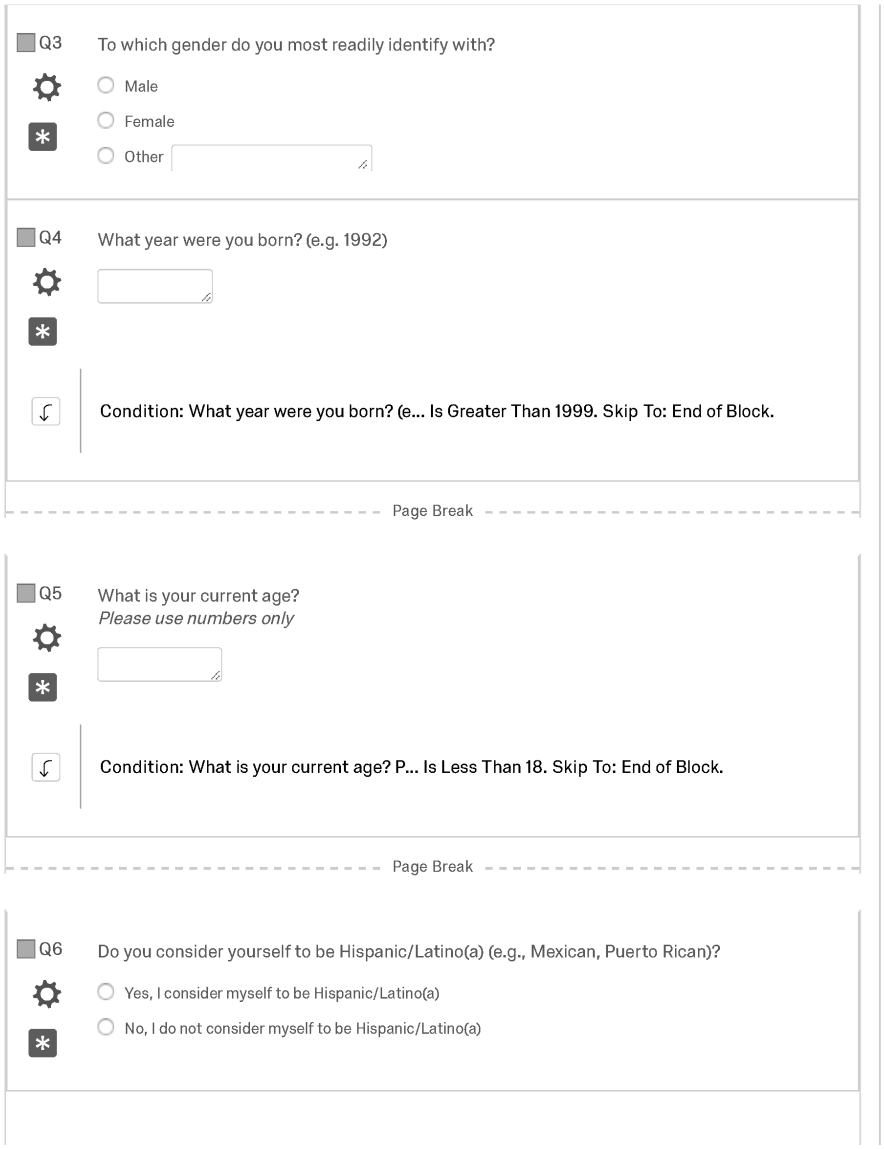
Political Affiliation- political party an individual most readily identifies with

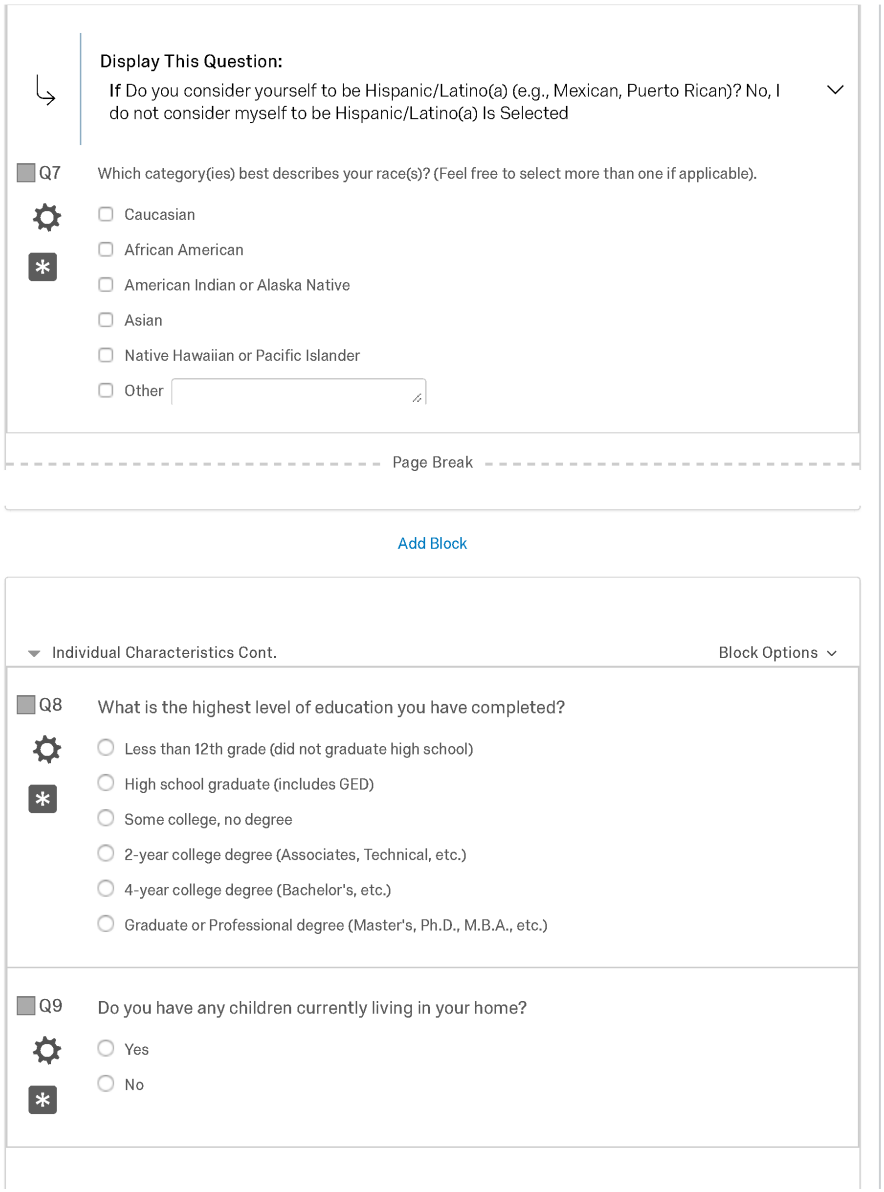
Publics- group of individuals who are similar to stakeholders, but organically established and seek out information instead of being chosen by organizations for marketing

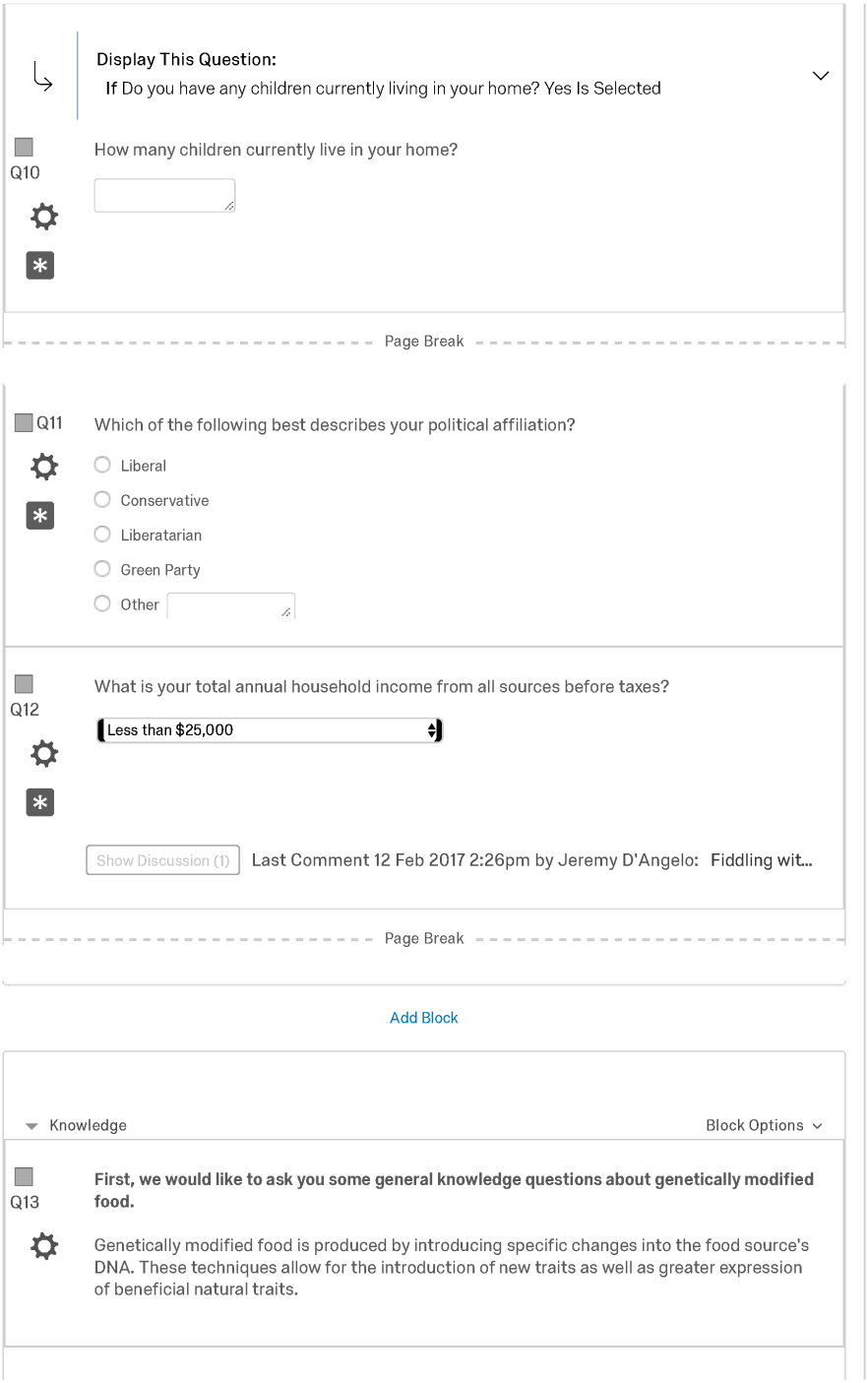
Systematic Processing- effortful, analytical processing of information about a topic

Appendix B - Survey




Q3
To which gender do you most readily identify with?
Male
Female
Other
Q4
What year were you born? (e.g. 1992)
Condition: What year were you born? (e... Is Greater Than 1999. Skip To: End of Block.
Page Break
Q5
What is your current age?
Please use numbers only
Condition: What is your current age? P... Is Less Than 18. Skip To: End of Block.
Page Break
Q6
Do you consider yourself to be Hispanic/Latino(a) (e.g., Mexican, Puerto Rican)?
Yes, I consider myself to be Hispanic/Latino(a)
No, I do not consider myself to be Hispanic/Latino(a)


Display This Question:
If Do you consider yourself to be Hispanic/Latino(a) (e.g., Mexican, Puerto Rican)? No, I do not consider myself to be Hispanic/Latino(a) Is Selected
Q7
Which category(ies) best describes your race(s)? (Feel free to select more than one if applicable).
Caucasian
African American
American Indian or Alaska Native
Asian
Native Hawaiian or Pacific Islander
Other
Page Break
Add Block
Individual Characteristics Cont.
Block Options
Q8
What is the highest level of education you have completed?
Less than 12th grade (did not graduate high school)
High school graduate (includes GED)
Some college, no degree
2-year college degree (Associates, Technical, etc.)
4-year college degree (Bachelor's, etc.)
Graduate or Professional degree (Master's, Ph.D., M.B.A., etc.)
Q9
Do you have any children currently living in your home?
Yes
No


Display This Question:
If Do you have any children currently living in your home? Yes Is Selected
Q10
How many children currently live in your home?
Page Break
Q11
Which of the following best describes your political affiliation?
Liberal
Conservative
Liberatarian
Green Party
Other
Q12
What is your total annual household income from all sources before taxes?
Less than $25,000
Show Discussion (1)
Last Comment 12 Feb 2017 2:26pm by Jeremy D'Angelo: Fiddling wit...
Page Break
Add Block
Knowledge
Block Options
Q13
First, we would like to ask you some general knowledge questions about genetically modified food.
Genetically modified food is produced by introducing specific changes into the food source's DNA. These techniques allow for the introduction of new traits as well as greater expression of beneficial natural traits.

Q14 True or False- Some genetically modified crops have been modified for increased herbicide resistance.

- True
- False

Q15 True or False- Genetically modified food can be sold as organic food.

- True
- False

Q16 True or False- According to the United States Food and Drug Administration, genetically modified food is safe to eat.

- True
- False

Q17 True or False- Plants or animals whose cells have been inserted with a gene from an unrelated species in order to take on specific characteristics are considered to be genetically modified.

- True
- False

Q18 Which one of the following foods does not have a genetically modified variety available for human consumption in the United States of America?

- corn
- soybeans
- apples
- tomatoes
- potatoes

Add Block

Issue Involvement Block Options

Q19

We are interested in your opinions on genetically modified food.

Q20

How bothered are you by genetically modified food?

I am not at all bothered by genetically modified food	○ ○ ○ ○ ○	I am extremely bothered by genetically modified food

Q21

How concerned are you about genetically modified food?

I am not at all concerned about genetically modified food	○ ○ ○ ○ ○	I am very concerned about genetically modified food

Add Block

Supportive/Nonsupportive — Block Options

Q22

Please select the circle between each set of adjectives that best represents your thoughts about genetically modified food.

Genetically modified food is:

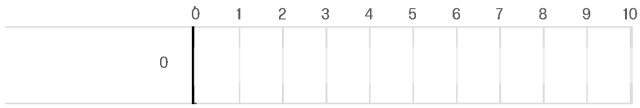
Good	○ ○ ○ ○ ○	Bad
Positive	○ ○ ○ ○ ○	Negative
Beneficial	○ ○ ○ ○ ○	Not Beneficial
Acceptable	○ ○ ○ ○ ○	Unacceptable
Necessary	○ ○ ○ ○ ○	Unnecessary
Important	○ ○ ○ ○ ○	Unimportant
Essential	○ ○ ○ ○ ○	Not Essential
Crucial	○ ○ ○ ○ ○	Trivial

Add Block

Affective Response Block Options

Q23 **We would like to know the level of worry you feel in relation to genetically modified food.**

Q24 When you think about genetically modified food, how much worry do you feel on a scale of zero to 10 with zero being none at all and 10 being a great deal?



Add Block

Perceived Hazard Characteristics Block Options

Q25 **We would like to ask you about your perceptions of genetically modified food.**

	None at all	A little	A moderate amount	A lot	A great deal
When it comes to your food choices and genetically modified food, how much control do you believe you have?	○	○	○	○	○
How much trust do you have in the government to regulate and ensure genetically modified food is safe?	○	○	○	○	○

Page Break

Q26 I believe it is _____ to become ill from consuming genetically modified food.

- ○ Extremely unlikely
- ○ Somewhat unlikely
- ○ Neither likely nor unlikely
- ○ Somewhat likely
- ○ Extremely likely

Q27

If I were to become ill or experience any other negative consequences from consuming genetically modified food, I believe the illness or effects from consuming genetically modified food would be _____?

- Extremely minimal
- Minimal
- Moderate
- Severe
- Extremely severe

Q28

I believe that the risk of genetically modified food is a direct risk to:
(Choose all that you agree with)

- Myself
- Other individuals
- The environment
- None of the above
- Other

9 Feb 2017 2:59pm Jeremy D'Angelo Personal vs impersonal risk

Hide Discussion | Add a Comment

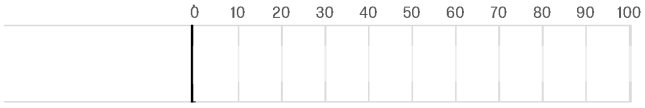
Add Block

Information Sufficiency Block Options

Q29

We would like you to rate your knowledge about the possible risks of genetically modified food. Please use a scale of zero to 100, where zero means knowing nothing and 100 means knowing everything you could possibly know about genetically modified food.

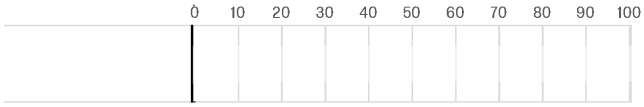
Using this scale, how much do you think you currently know about the risk from genetically modified food?



Q30

Think of that same scale again. This time, we would like you to estimate how much knowledge you would need to deal adequately with the possible risk of genetically modified food in your own life. Of course, you might feel you need the same, more, or possibly even less information about this topic.

Using a scale of zero to 100, how much information about genetically modified food would be sufficient for you to feel informed about the topic?



Add Block

Relevant Channel Beliefs — Block Options

Q31

We would like to hear your opinions on information sources.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
The media often exaggerate and sensationalize the news.	○	○	○	○	○
News media often represent their own bias and interests.	○	○	○	○	○
When the same information appears in many places, I'm more likely to believe it.	○	○	○	○	○
Stories with statistics are more believable than those without.	○	○	○	○	○
Individual news items may seem like bits and pieces, but in the long run, they form a meaningful pattern.	○	○	○	○	○

Add Block

Information Gathering Capacity — Block Options

Q32 **We would like to ask you questions about how much difficulty you have gathering information about genetically modified food.**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
If I wanted to, I could easily get all the information I need about genetically modified food.	○	○	○	○	○
It is hard for me to get useful information about genetically modified food.	○	○	○	○	○

Add Block

Informational Subjective Norms Block Options

Q33 **We would like to ask you about pressure you may or may not feel from others about genetically modified food.**

Q34 People who are important to me would expect me to stay on top of information about genetically modified food.

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Add Block

Information Seeking Block Options

Q35

We would like to ask you questions about how you seek out information about genetically modified food.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
When the topic of genetically modified food comes up, I'm likely to tune it out.	○	○	○	○	○
Whenever the topic of genetically modified food comes up, I go out of my way to avoid learning more about it.	○	○	○	○	○
Gathering a lot of information on the risks of genetically modified food is a waste of time.	○	○	○	○	○
When the topic of risks of genetically modified food comes up, I try to learn more about it.	○	○	○	○	○
When it comes to the risk of genetically modified food, I'm likely to go out of my way to get more information.	○	○	○	○	○

Add Block

Information Processing Block Options

Q36

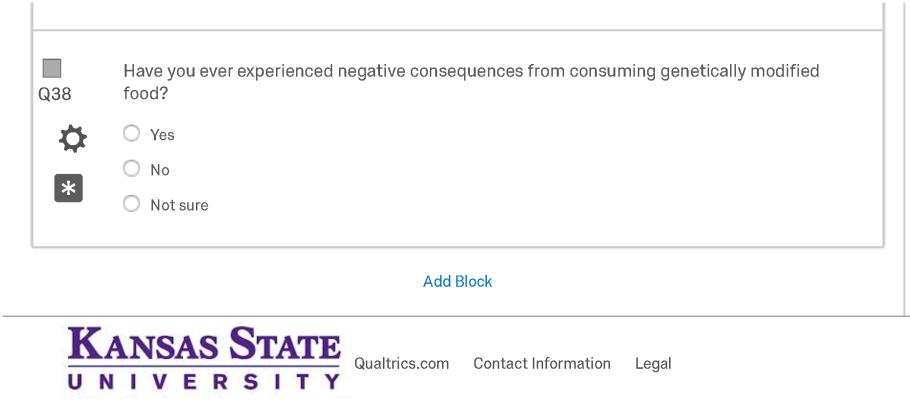
We would like to ask you about how you process information about genetically modified food.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
When I encounter information about genetically modified food, I focus on only a few key points.	○	○	○	○	○
If I have to act on this matter, the advice of one expert is good enough for me.	○	○	○	○	○
When I see or hear information about genetically modified food, I rarely spend much time thinking about it.	○	○	○	○	○
There is far more information on genetically modified food than I personally need.	○	○	○	○	○

Page Break

Q37

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
After I encounter information about genetically modified food, I am likely to stop and think about it.	○	○	○	○	○
If I need to act on this matter, the more viewpoints I get the better.	○	○	○	○	○
It is important for me to interpret information about genetically modified food in a way that applies directly to my life.	○	○	○	○	○
After thinking about genetically modified food, I have a broader understanding of it.	○	○	○	○	○
When I encounter information about this topic, I read or listen to most of it, even though I may not agree with its perspective.	○	○	○	○	○



KANSAS STATE UNIVERSITY Qualtrics.com Contact Information Legal

Appendix C - IRB Approval

KANSAS STATE UNIVERSITY | University Research Compliance Office

TO: Dr. Jason Ellis
Communications and Agricultural Education
309 Umberger Hall

Proposal Number: 8671

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 03/01/2017

RE: Proposal Entitled, "Identifying Factors of Millennial Publics Risk Information Seeking and Processing Strategies of Genetically Modified Food"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written – and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: 2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

203 Fairchild Hall, Lower Mezzanine, 1601 Vattier St., Manhattan, KS 66506-1103 | 785-532-3224 | fax: 785-532-3278 | comply@ksu.edu | k-state.edu/research/comply