

**DETERMINING THE EFFECTS OF EVIDENCE-BASED MESSAGING
ON MILLENNIAL AGRICULTURALISTS' ATTITUDES TOWARDS
GENETICALLY MODIFIED (GM) FOODS**

by

Erica M. Ballmer

A Thesis

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Master of Science



Department of Youth Development & Agricultural Education

West Lafayette, Indiana

May 2018

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STATEMENT OF COMMITTEE APPROVAL**

Dr. Linda J. Pfeiffer, Chair

Department of Youth Development & Agricultural Education

Dr. Mark A. Tucker

Department of Youth Development & Agricultural Education

Dr. Torsten O. Reimer

Brian Lamb School of Communication

Approved by:

Dr. Mark A. Russell

Head of the Graduate Program

PREVIEW

To my family

PREVIEW

ACKNOWLEDGMENTS

A huge thank you goes out to everyone who has supported and encouraged me throughout my graduate school adventure to complete my masters degree. This list is by no means comprehensive and if you do not find your name here, please know you are not forgotten. I am thankful for everyone that has been a part of my journey through graduate school.

To Dr. Pfeiffer – thank you for bringing me to Purdue and allowing me learn more about research. Thank you for allowing me to delve into a topic that greatly interests me. Thank you for allowing me to share research not only locally, but also internationally. Thank you for your knowledge and expertise and all of the wisdom you have shared with me over these past two years.

To my committee – Dr. Tucker, and Dr. Reimer, thank you for your advice and wisdom throughout my thesis project. I greatly appreciate all of the time, feedback, and support provided as I navigated through the research process.

To Wenbin Zhu and the Purdue Statistical Consulting Service, thank you for your advice and willingness to meet and explain statistical analyses. Your wisdom was very helpful in guiding my data analyses and was very much appreciated.

To Jessica and Olamide – thank you for being amazing lab mates. I am thankful your friendship, support and encouragement both in and out of the office, and for going with me or taking me along on a travel adventure. Thank you for wisdom as “older sisters” and always being there to listen or provide advice.

To my Chi Alpha family: Marquetta, Olamide, Angelica, Liliane, Samantha, Arryn, Jieun, Jerica, Horane, Tunji, Ibukun, Henry, Tobi, Dan, and Iris – thank you for creating an atmosphere of a home away from home for me here at Purdue. Thank you for your unconditional

support and encouragement, even when it seemed like the mountains of graduate school were too much to climb. I am grateful for all of your prayers, wisdom, and guidance. This is the kind of community I was missing and I am so glad I was able to find it here at Purdue with all of you.

To Miranda, Dottie, Kami, Brandon, Ashley, Britt, Elise, Kristy, Chloe and Lauren – thank you for your friendship, laughs, and camaraderie. I have been told that graduate school can be an isolating experience, but thanks to all of you, my experience here at Purdue was far from that. Thank you for initiating and including me shenanigans and adventures. I would have never made it through graduate school without friends like all of you.

To Neil – thank you for your support and encouragement over the past few months. Thank you for being my first audience for my very rough trial run of my presentation. Most importantly, thank you for always listening to the ups and downs of graduate school and thanks for tagging along on some of the crazy adventures that came along with it.

Finally, to my family – Mom, Ciera, and Kenny, thank you for the never-ending love and support through all of my crazy endeavors, including graduate school. Thank you for the phone calls, text messages, and snapchats to stay in touch and keep me in the loop while I am away from home. Thank you for always being my biggest fans!

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PREVIEW

ABSTRACT

Author: Ballmer, Erica, M. MS

Institution: Purdue University

Degree Received: May 2018

Title: Determining the Influence of Evidence-Based Messaging on Millennial Agriculturalists' Attitudes towards Genetically Modified (GM) Foods

Major Professor: Linda J. Pfeiffer

Genetically modified foods and crops are a topic of heated debate in the United States. As with all issues, messaging has the potential to influence and change an individual's attitude. Through the lens of social judgment theory, this quasi-experimental study investigated the influence of an evidence-based message on millennial agricultural students' attitudes towards genetically modified foods and crops, while taking into account participants' ego-involvements for the issue. Sixty-nine undergraduate students in the College of Agriculture participated in this study – comprised of a pre-test and post-test questionnaire with an evidence-based message intervention between.

The major finding from this study was that for the issue of genetically modified foods, millennial agricultural students' with high ego-involvement are capable of attitude change and moving their anchor points in the direction of viewing genetically modified foods and crops less favorably than prior to the evidence-based message intervention. This result was unexpected, but important. Another key finding is that the majority of millennial agricultural students reported holding favorable attitudes towards genetically modified foods. In regards to the risks of genetically modified foods, the majority of participants disagreed that there is any risk associated with eating genetically modified foods and were neutral towards any environmental risks of genetically modified crops. This study also investigated the role of ego-

involvement and the widths of the latitudes of acceptance, noncommitment, and rejection. While there was a trend for the latitude of acceptance to increase and for the latitude of rejection to decrease for both the high and low ego-involvement groups, these findings were insignificant.

Overall, this study's findings provides great insight to science communicators who are messaging with the goal of influencing attitude change. Utilizing key elements of science communication including, weight of evidence reporting, weight of experts reporting, reinforcement of self-identity, credibility, valence, and framing theory, it is possible to influence attitude change, at least for millennial agricultural students with high ego-involvement for the issue of genetically modified foods. Future research should expand to include other segments of the population, as well as other science issues.

CHAPTER 1. INTRODUCTION

1.1 Introduction

In modern times, the issue of genetically modified foods and crops has been a topic of heated debates, as some members of the American population hold favorable attitudes, while others hold unfavorable attitudes towards genetic modification. On one side of the debate, there is the hope for improved crop yields to help solve issues of world hunger and food insecurity (Diehl, 2017). However, on the other side of the debate, there are concerns about the risk of adverse health effects and negative consequences to the environment (Pew Research Center, 2016). Overall, three-fourths of consumers believe that foods containing a genetically modified ingredient are worse than conventional foods for human health (Pew Research Center, 2016). However, genetically modified crops are still highly favored among farmers across the United States (United States Department of Agriculture, 2017). Even so, there is an ongoing mystery about why there are such different attitudes among members of the American public.

1.1.1 Consumers and Genetically Modified Foods

American consumers are faced with an abundance of decisions while purchasing food in the grocery store, including whether or not they should purchase genetically modified foods. Some consumers are especially concerned about the safety of eating genetically modified food, and the potential adverse effects of genetically modified foods on the environment (Pew Research Center, 2016), while other consumers, primarily see the benefits of genetically modified crops for human food consumption (Diehl, 2017).

One factor that has been proposed through other research to explain differences in attitudes towards an issue and how those attitudes may be influenced is ego-involvement (Sherif, Sherif & Nebergall, 1965; Teng, Khong, & Goh, 2015). Ego-involvement is defined as the importance or centrality of an issue to one's life; arouses an intense attitude or, rather, whether the individual can regard the issue with some detachment as primarily a 'factual' matter (Sherif & Sherif, 1967). Previous research has demonstrated that ego-involvement influences attitude strength as well as intentions to perform a certain behavior (Lapinski & Rimal, 2005; Park et al., 2015). Further, early research demonstrated that individuals who exhibit high ego-involvement for an issue are more difficult to persuade to alter their attitude than those who exhibit low ego-involvement (Sherif, Sherif, & Nebergall, 1965).

Potentially, an individual's ego-involvement for genetically modified foods may affect their decision making and how they are influenced in regards to the issue of genetically modified food. Some consumers may have a low ego-involvement in regards to genetically modified food decisions, and may not put a lot of thought into the issue. Other consumers, however, may have a higher ego-involvement in regards to food decisions and may spend a greater amount of time reading and contemplating options before making a decision on whether or not to eat genetically modified foods.

Consumers are not the only members of the public who hold attitudes towards and make decisions about genetically modified foods. Farmers and agriculturalists, the individuals who are growing and producing food, also hold attitudes towards genetically modified foods and crops. These individuals are also consumers. Of particular interest, these consumers who come from an agricultural background tend to express lesser concerns about consuming genetically modified food (Kondoh & Jussaume, 2005). For example, farmers and those familiar with agriculture tend

to be more accepting of genetic engineering and genetically modified foods and crops (Kondoh & Jassume, 2005). However, it is unknown if this is also true for millennials studying agriculture, specifically.

1.1.2 The Role of the Millennial Generation as Consumers

This study will focus on millennials in Indiana, as a key segment of the consumer population. Overall, millennials comprise 23 percent of the U.S. population, a majority of the workforce, and they are projected to have the most disposable income by 2020 (Speier, 2016). Therefore, learning more about the members of the millennial generation and their attitudes towards genetically modified foods is of great interest to those in the food industry (Speier, 2016). More precisely, this study will focus on millennial consumers with an agricultural background, specifically university students studying agriculture. Through the lens of social judgment theory, this proposed study seeks to determine the effects of factors that may play a role in altering agricultural, millennial consumers' attitudes towards genetically modified foods.

1.2 Statement of Research Problem

Overall, there is consensus among scientists, including statements from the National Academies of Science, Engineering and Medicine (NAS), the American Medical Association (AMA), and the European Commission that genetically modified food presents no greater threat or harm than other conventional foods (NAS, 2016). Despite the scientific consensus, polling has indicated that the general public does not necessarily agree with the scientific consensus on genetically modified food. In total, only 37 percent of the general public would agree that genetically modified foods are safe, while 88 percent of scientists from the American

Association for the Advancement of Science would say that genetically modified foods are no riskier to eat than conventional foods (Pew Research Center, 2015a). This divide in viewpoints is the largest gap on any emergent technology between scientists and the general public (Pew Research Center, 2015a). Further, two-thirds of Americans currently do not believe that scientists understand the health implications of genetically modified foods (Pew Research Center, 2015b). It is clear there is gap in agreement between scientists and the general public regarding the safety of genetically modified foods.

Prior research has demonstrated that those affiliated with farming and agriculture are highly accepting of genetic engineering and genetically modified crops and foods (Kondoh & Jussaume, 2005). This high acceptance is based on the finding that genetically modified foods are no more risky to eat than conventional foods (often interpreted as safe to consume) and that planting genetically modified crops will result in higher yields, suggesting there are economic gains for farmers (Diehl, 2017).

However, while agriculturalists and scientists may agree on the safety of consuming genetically modified foods, scientists do acknowledge there may be some non-consumption-related risks related to genetically modified foods. So far, increased yields for genetically modified crops compared to non-genetically modified varieties has not been demonstrated (National Academies, 2016). In addition, scientists recognize that genetically modified foods pose some potential risks to the environment, such as increased herbicide use and weed resistance (National Academies, 2016). Overall, the research has demonstrated that many agriculturalists may not recognize genetically modified foods as having any health, environmental, or economic risks (Kondoh & Jussaume, 2005). Therefore, scientists and agriculturalists also hold differing views towards genetically modified foods.

Farmers and agriculturalists are producers and consumers of food and other agricultural products. Kondoh & Jussaume (2005) found that farmers do hold favorable attitudes towards genetically modified foods. Therefore, these individuals are likely part of the 37% of American consumers who believe genetically modified foods are safe to eat (Pew Research Center, 2015a). However, it is not known if the same is true for millennial agriculturalists, specifically.

Therefore, the study is guided by the following question: Is it possible to for millennial consumers with an agricultural background to recognize risks associated with genetically modified crops and foods and change their attitudes towards genetically modified foods through an evidence-based message intervention?

1.3 Need for Study

There has been a considerable amount of research regarding attitudes towards genetically modified foods in the United States. Many researchers have studied general consumer attitudes towards genetically modified foods (Hallman et al., 2003; Lusk et al., 2004; Pew Research Center, 2016; Ruth et al., 2016; Rumble et al., 2017; Traill et al., 2004), while others have studied attitudes specifically related to the risks of genetically modified foods (Ganiere et al., 2006; Gaskell et al., 2004). Specifically, in a communication context, there have been fewer studies related to attitudes towards genetically modified foods. Nevertheless, recent communication-related research has demonstrated that source credibility is an important factor related to influencing attitudes towards genetically modified foods (Ruth et al., 2015; Wunderlich and Gatto, 2015). In regards to farmers' and agriculturalists' attitudes towards genetically modified foods, Kondoh & Jassaume (2006) found that these individuals hold very

favorable attitudes towards genetically modified foods. However, no studies were found that focused on the attitudes of millennial agriculturalists.

In addition, there were some studies found that utilized social judgment theory and persuasive messaging. Many of these studies focused on social issues, such as racism (Sherif et al., 1973) and abortion (Sarup et al., 1991). Fewer studies were found in risk communication contexts. Stefanelli & Seidl (2014) found that messages that were focused on the process of nuclear energy were more likely to fall into participants' latitudes of acceptance than messages that focused on risks or benefits; however the study did not encompass ego-involvement as a factor. Finally, one study was found that used social judgment theory in the context of genetically modified foods. Rumble et al., (2017) found that females had wider latitudes of acceptance in regards to the issue of genetically modified foods than males; but, ego-involvement was not included as a variable.

1.4 Hypotheses

As the literature mentioned prior in the prior section demonstrates, ego-involvement is believed to play a role in attitude change. According to the tenants of social judgment theory, individuals with high ego-involvements for an issue are more difficult to persuade than individuals with low ego-involvements (Sherif, Sherif & Nebergall, 1967). These highly ego-involved individuals are less likely to demonstrate a change in attitude due to their large latitudes of rejection (Sherif, Sherif & Nebergall, 1967). This positive relationship between ego-involvement and width of the latitude of rejection has been demonstrated in previous research studies (Bodaken & Sereno, 1976; Park et al., 2007; Rhine & Severance, 1970). Therefore, two

hypotheses, rooted in the theoretical framework of social judgment theory, were investigated in this study:

Hypothesis 1: Participants with a low ego-involvement towards genetically modified foods will be more likely to demonstrate a change in attitude after reading an evidence-based message than individuals with a high ego-involvement towards genetically modified foods.

Hypothesis 2: Participants with a high ego-involvement will have larger latitudes of rejection regarding genetically modified foods than participants with a low ego-involvement.

1.5 Research Questions

Three research questions, informed by the conceptual and theoretical frameworks, guided this study:

1. What are millennial agricultural students' attitudes towards genetically modified foods?
2. How do millennial agricultural students' attitudes reflect either agreement or disagreement of the potential risks of genetically modified foods?
3. How does the width of an individual's latitudes of acceptance, noncommitment, and rejection change after exposure to an evidence-based message about genetically modified foods?

1.6 Significance of the Study

One way of investigating effective communication strategies in regards to genetically modified foods is through the framework of social judgment theory. Social judgment theory

explains attitude change through seeking to understand how an individual perceives a message or new information based on their pre-existing attitude towards the issue and their level of ego-involvement (Sherif, Sherif, & Nebergall, 1965). Social judgment theory has been applied in various scientific risk communication contexts, however, not in the case of evidence-based science messaging and genetically modified foods. The topic of genetically modified foods is different from other risk communication contexts as the overall general public disagrees with scientists on the safety of genetically modified foods. The study provides greater insight as to how scientific information, in the form of an evidence-based message, may be used to alter public perceptions of genetically modified foods, while taking into account an individual's ego-involvement towards an issue.

Results from the study may be used to inform scientists and science communicators in implementing various message elements and techniques when informing consumers about genetically modified foods. If scientists and science communicators are better able to create messages regarding the safety of eating genetically modified foods in a way that consumers resonate with, perhaps there would no longer be such a great divide in attitudes between scientists in the general public. Further, effective communication could also bridge the gap of differing attitudes between scientists and those with an agricultural background, in regards to environmental risks.

Additionally, marketers will be able to use the results to create campaigns, utilizing the messaging elements and targeting consumers based on prior attitudes and ego-involvement, to inform or persuade everyday consumers about genetically modified foods. When marketers successfully reach consumers, their company or organization benefits, often from increased sales revenue. As Millennials comprise a large portion of the population and hold the majority of the

buying power in the United States, marketers who successfully reach Millennials will reap great benefits while promoting food products, either genetically modified or non-genetically modified.

Finally, understanding public knowledge and concerns about genetically modified foods also has the potential to inform and influence policy makers in crafting legislation regarding genetically modified foods. Lobbyists who know how to communicate scientific information and create a message that consumers will consider and understand. This message could also be used to influence policymakers' attitudes and ultimately their decisions and regulations. Overall, the study may provide useful insights for scientists, science communicators, marketers, and policymakers in the food and agricultural industries.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

This chapter will provide an overview of the history of, and the current scientific evidence of, as well as public opinion towards genetically modified foods to provide background for the debate surrounding the issue. Next, the key elements of evidence-based messaging in science communication are presented to understand how the message intervention for the study was created to promote attitude change. The theoretical framework, highlighting the key constructs including the latitudes of acceptance, noncommitment and rejection, anchor point, ego-involvement, and the effects of assimilation and contrast, as well as previous research and application of the theory are presented. Then, the conceptual framework will provide an overview of the independent and dependent variables of the study. To conclude, the need for study will be explained, with a brief chapter summary to follow.

2.2 History of Genetically Modified Foods in the United States

Genetically modified foods are a topic of heated debate; to understand how the issue came to be, it is important to understand the history of genetically modified foods in the United States. Genetically modified foods are foods that are or contain an ingredient that is from a genetically modified organism (NAS, 2016). A genetically modified organism is created through a process known as genetic engineering (Chassy, 2007). First developed in the 1970s, genetic engineering is a type of biotechnology that involves inserting or altering the genetic material of an organism to promote a desired trait that the organism did not previously express (NAS, 2016).