UNDERSTANDING THE EFFECTS OF AGGRESSIVE AND POLITE COMMUNICATION STYLES IN THE CONTEXT OF RISK COMMUNICATION

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ABSTRACT

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Based on expectancy violation theory, two experiments examine the effects of two communication styles—aggressive and polite communication—in the contexts of child vaccination and GMO debates. The first study tests the effects of aggressive, neutral and polite communication styles with the consideration of parents' attitudes toward the issue. The second study further considers the effect of communication source, which employs a 3 (aggressive, neutral, polite message) x 2 (scientist, non-scientist) between-subject experiment. The results show that expectancy violation significantly mediates the relationship between message style and outcomes, attitude toward the communication issue as well as the source affect how individuals process the message. The results provide a novel way to understand the effect of communication style and practical implications for communicators to operate communication style during interactions in risk, science or health contexts.

Keywords: communication style, attitude toward the issue, source of information, expectancy violation.

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INTRODUCTION

We have long passed the era when communication researchers believed that changes in attitude could be attained by simply educating audiences on risks of certain behaviors (Bauer, Allum, & Miller, 2007). Indeed, communication style is an important element of communication strategy (Sparks, Areni, & Cox, 1998), but little research has been done to explore this topic in the context of risk communication. As such, this dissertation focuses on assessing the potential effects of two contrasting communication styles—aggressive and polite—on individuals' attitudes. Study one attempts to better understand how audiences react to different communication styles, including audiences' evaluation of the message quality and writer likability. Study two further assesses the effects of different styles by different levels of source expertise (scientist vs. layperson). Moreover, both studies take place in the differing common risk communication contexts of child vaccination and GMO product use.

It has become common to denounce those who refuse to accept the scientific facts on issues such as GMO product use, climate change, and vaccinations (Hiltzik, 2015, January; Romm, 2012, May). Overall, this project seeks to understand the phenomenon of public resistance to some scientific facts such as the necessity of child vaccination and genetic modified crops. The premise of this project is that risk communicators may be correct to question those who reject scientific consensus, but even well-intentioned attempts at risk communication can have unintended consequences if the communicator does not fully attend to the potential effects of communication style. In this regard, a range of literature (i.e., verbal aggression, language intensity, incivility, etc.) has been published on both the positive and negative effects of what this project defines as *aggressive communication*. Although this project has largely been done in non-risk contexts, an initial study by the authors suggests that there are similar results in risk

contexts, such as debates over genetically engineered food and nuclear energy (Yuan, Besley, & Lou, 2016).

On the other hand, *polite communication* is often described as the communication style opposite to aggressive communication (De Vries, Bakker-Pieper, Konings, & Schouten, 2011; Kienpointner, 1997) and is commonly understood as a way to make communication more effective (Brown & Levinson, 1987). Polite communication, including concepts such as niceness, was initially discussed in the context of interpersonal communication, but has been extended to the field of mass communication in the past decade as an element of persuasion (Goldsmith & MacGeorge, 2000). However, politeness may also have negative effects and make communication less powerful, a phenomenon that is also examined in the accompanying studies.

This project also argues for aggressive and polite communication styles to be considered in conjunction with one another. Although the communication literature often presents them as complimentary concepts, previous researchers suggest a need to study them separately. As such, they have often only examined the relationship between aggressive and non-aggressive, or polite and non-polite communication. Thus, past findings are insufficient for determining if the solution to reversing the negative side effects of aggressive communication is the application of politeness.

Further, the current study may also provide novel insight into when and why aggressiveness and politeness are most likely to have effects on the effectiveness of communication messages. Specifically, given that the style of communication may be perceived differently by audiences, this research seeks to test the degree to which audiences' expectations shape the effects of both aggressive and polite risk communication. In this regard, expectations can be violated either positively (by using overly polite language) or negatively (by using overly

aggressive language) (J. Burgoon & Hale, 1988). We hope the findings of current studies can provide evidence for communicators to consider individuals' expectations when making communication choices, as well as illuminate what factors may influence individual's expectation and affect the use of different communication styles.

A number of studies that focused on individual's information processing such as Elaboration Likelihood Model (ELM: Petty & Cacioppo, 1986) illustrates that message receivers use central-route (systematic) and peripheral-route (heuristic) processing to evaluate information. A number of factors interfere with effective information processing. Such factors reflect differences among individuals (i.e. pre-existing attitude toward specific issues) or message-specific features (i.e. communication source). Therefore, in this set of studies, we not only propose that individuals have general expectations for the language style risk communicators should use, we also take the effect of *source expertise* into consideration. One evidence for the argument that source differences affect expectancy violation is the public image test from Fiske and Dupree (2014). Their findings show that individuals rated competence and warmth very differently for different social groups, such as dishwashers, cooks, professors, scientists, and doctors. As such, we argue that individuals may have different expectations for communicators with different levels of related expertise. In the current studies we focus only on competence/expertise and aim to demonstrate how understanding audiences' varying expectations of different communicators can help draw a clearer picture of the effects of these expectations on communication style.

The practical purpose of this set of studies is to explore the effects of aggressive and polite communication styles in order to help communicators determine how to maximize the positive impacts of risk communication style and prevent unintended consequences by taking

audience expectations into consideration. The first section discusses the need for the current study in vaccine and GMOs communication literature. Here, we discuss how this work can support existing literature on aggressive and polite communication, expectancy violation, and the effects of communication source. We then use the literature review to propose a set of hypotheses and research questions that make up the subject of the two studies.

STUDY ONE

Child Vaccination Debates

The ongoing debate on child vaccination, especially in terms of the vaccine for measles, mumps, and rubella (MMR), has been decades in the making. Although scientists have repeatedly shown that there is no relationship between autism and the MMR vaccine, the debate has not stopped. A report from the Centers for Disease Control and Prevention (CDC) on vaccination coverage among children in kindergarten from 2013–2014 shows that more than half of the states in the U.S. (26 of 50) did not report meeting the government target (95%) for MMR (Seither et al., 2014). Another study shows that 57% of parents who delay and refuse vaccines say they are concerned about autism, and 63% of them are afraid of possible side effects (Smith et al., 2011). The debate on vaccinations and autism in the media has influenced many parents' opinions and decisions (Petts & Niemeyer, 2004). The consequences of this debate have likely caused widespread harm, and have attracted the attention of health practitioners and researchers. In the United States, one study shows that the Internet was the dominant source for parents to learn about vaccines and that parents have received a lot of misinformation about vaccines (Downs, de Bruin, & Fischhoff, 2008). With the large amount of information about vaccination on the Internet, it has been difficult for parents to make informed decisions regarding the health of their children, especially within a relatively short time period. For example, the MMR vaccine requires a two-dose series at ages 12 through 15 months and 4 through 6 years of age (Centers for Disease Control and Prevention [CDC], 2015).

Therefore, finding effective ways to communicate with parents about vaccinations has become a priority for health and science communicators. Many factors that may affect the promotion of vaccinating children have therefore been studied. For example, a study in the

United Kingdom investigated the importance of face-to-face communication with professionals and the effects of different information sources on the persuasive effect (Petts & Niemeyer, 2004). Another study conducted in the Philippines found that specific information about vaccines has more influence on parents' behavioral changes than general vaccine knowledge, and the influence of mass media campaigns is bigger than interpersonal sources such as health providers (McDivitt, Zimicki, & Hornik, 1997; Zimicki et al., 1994). However, a paucity of research has examined communication styles in the context of risk communication and how risk communicators, such as vaccination activists, utilize different styles of communication.

Despite the fact that there are no statistics showing how often vaccine communicators use aggressive or polite styles of communication, we found a great amount of anecdotal evidence of aggressive and polite communication regarding vaccines. Any review of Internet content on child vaccination yields a large number of aggressive arguments. For example, a pediatrician from UCLA recently used the words "dumb people" to refer to anti-vaccine parents in an interview with *The New York Times* (Nagourney & Goodnough, 2015, January). Meanwhile, a columnist from *The Los Angeles Times* called such people "public enemies" on his personal Twitter account (Hiltzik, 2015, January). Furthermore, several medical doctors spoke aggressively about anti-vaccine parents on *Jimmy Kimmel Live*. This video alone had been watched almost 6 million times as of late 2015 (Kimmel, 2015, Feburary 27). Although there are not many obvious, outstanding keywords to identify polite communication styles, it is also widely used by vaccine communicators. For example, a doctor mentioned that, during conversations with parents, he often says, "we also want what's best for their children and that we're all on the same team" (Yasgur, 2014, September). Another post from a vaccine advocate

wrote, “We should usually respect parental medical choices for children, unless they are not in the best interest of the child” (Vara, 2013, September).

Although these anecdotes are easily observed, few studies have demonstrated the relative effectiveness of these two contrasting communication styles on individuals’ decision-making processes. This work considers how the use of these two specific types of message styles might shape parents’ views about this issue and also considers the effects of different communicators involved in this type of risk communication during communication interactions. In the following sections, we review the literature on these two communication styles in order to further discuss the rationale for this focus.

Communication Style

Aggressive and polite communication styles should be understood as two specific communication styles among a range of potential styles described within a broad scope of literature. *Communication style* can be defined as “the characteristic way a person sends verbal, paraverbal, and nonverbal signals in social interactions denoting (a) who he or she is or wants to (appear to) be, (b) how he or she tends to relate to people with whom he or she interacts, and (c) in what way his or her messages should usually be interpreted” (De Vries, Bakker-Pieper, Alting Siberg, van Gameren, & Vlug, 2009, p. 2). Previous researchers have often used the term “communication style” and communication tone” interchangeably (i.e. Edwards & Noller, 1998; Simmons, 2010). Researchers have categorized communication style in different ways. For example, Sorenson and Savage (1989) found two primary dimensions based on previous studies: *dominance*, which is described as a directive approach with little discussion; and *supportiveness*, which is described as a delegated approach that gives audiences control over decision-making. Other similar dimensions from Dillard, Solomon, and Palmer (1999) are *affiliation*, which is

defined as "the extent to which one individual regards another positively," and *dominance*, which is defined as "the degree to which one actor attempts to regular the behavior of the other" (p.53). Edwards and Noller (1998) proposed a communication tone rating scale with six items, including dominating, respectful, warm, patronizing, supportive and nurturing. De Vries et al. (2009) proposed a more detailed communication style model with seven dimensions: preciseness (communicating with professional or precise language), reflectiveness (dissecting someone or something passionately), expressiveness (communicating with extroverted or eloquent language), supportiveness (communicating to "comfort someone" or "to put someone in the limelight"), emotionality (communicating with piqued, stressed, or sad utterances), niceness (communicating in a softhearted, nice or friendly manner), and threateningness (communicating with abusive language) (p.12). De Vries et al. (2011) later modified the seven dimensions to a six-dimensional communication styles inventory: expressiveness, preciseness, verbal aggressiveness (comprising threateningness, reversed niceness, and reversed supportiveness), questioningness (renamed from reflectiveness), emotionality, and impression manipulativeness (a deceptive communication style such as ingratiation). Although each of these communication styles may have different effects on a message, it is not usually feasible to examine them all at once. In the current study, we only focus on one type of communication style—verbal aggressiveness and its reversed style politeness—based on De Vries et al. (2011). In the following sections we review the literature on both communication styles and develop our rationale of revisiting them.

Aggressive Communication

As one of the common styles people appear to use when communicating about child vaccines, it is important to understand how several strands of research conceptualize aggressive communication, including verbal aggression, incivility, language intensity, and forceful

language. These aspects are explored together in the present study under the general concept of *aggressive communication*. First, *verbal aggression* is defined as "the tendency to attack the self-concepts of individuals instead of, or in addition to, their positions on topics of communication" (Infante, 1987, p. 164). In other words, verbal aggression includes not only arguments based on content, but also *ad hominem* arguments. The second concept is *incivility*, which is described as a communication style that has "a lack of respect for and/or frustration with the opposition" (Mutz & Reeves, 2005, p. 5). Researchers found that uncivil discourse is more and more common in mass media communication, especially political communication (Higgins, Montgomery, Smith, & Tolson, 2011). Third, *language intensity* is described as the property of language that is conveyed emotionally and in ways that deviate from a neutral position (Bowers, 1963; Hamilton, Hunter, & Burgoon, 1990). Language intensity can be divided into *extremity*, which refers to the level of magnitude on wording (i.e., "some" vs. "many"), and *stylistic intensity*, which refers to the intense wordings used during communication. In the current study, we mainly focus on stylistic intensity. The difference between language intensity and verbal aggression is that verbal aggression includes an element of attacking a subject (Greenberg, 1976; Mosher & Proenza, 1968). Lastly, the literature on *forceful language* also provides similar descriptions of aggressiveness (Jenkins & Dragojevic, 2011; Quick & Considine, 2008). In general, forceful language contains two elements: demeaning language and controlling language (Jenkins & Dragojevic, 2011). First, similar to aggressiveness, *demeaning language* uses utterances that demean anyone who disagrees with the speaker's opinion. Second, *controlling language* includes imperative utterances that emphasize doing things in certain ways, such as commands and orders (Miller, Lane, Deatrick, Young, & Potts, 2007).

Based on the overlaps within the four concepts reviewed above, we define *aggressive communication as a style of language that combines intense language with an attack on a person or persons.* Aggressive risk communication would thus be when such communication focuses on issues related to risk.

A number of studies have investigated the effects of what we consider aggressive communication in different contexts. First, several studies on teacher–student communication found that students' perceived aggressiveness induces a series of negative effects on students' self-reported motivation, learning, and satisfaction (Martin, Mottet, & Myers, 2000; S. Myers & Rocca, 2000; Scott A. Myers, 2002; Scott A Myers & Rocca, 2001). More specifically, some research has shown that students who find their instructors verbally aggressive will also see those instructors less attractive, less likable (Rocca & McCroskey, 1999), less trustworthy, less caring, and less competent (S. A. Myers, 2001). Similarly, research on incivility found that having uncivil language in an article about climate change jeopardized the communicator's credibility with readers (Thorson, Vraga, & Ekdale, 2010). Researchers also examined aggressive communication in campaign messages, where a common strategy is to defame the competitors or highlight their weaknesses (McNair, 2011). Aggressive communication is widely used, especially in political campaigns, and previous studies have found that an aggressive approach can damage the trustworthiness of the attacker as well as the trustworthiness of those being attacked (Lau, Sigelman, & Rovner, 2007).

Some positive effects of aggressive communication have also been observed. First, aggressive messages were found to be more entertaining, which may help attract a larger audience (Mutz & Reeves, 2005). Second, an aggressive approach can also increase audience engagement. For example, audiences have been found to be more interested in uncivil messages

(Brooks & Geer, 2007). Although these studies were conducted in the context of political communication, we expect that similar effects can be observed in controversial risk-related issues such as child vaccination. The literature on powerful speech also points to the potentially positive aspects of aggressive communication. Researchers have found that the lack of certain features, such as hedges, hesitations, or the polite form, can help strengthen the power of speech and thus make it more convincing (Blankenship & Holtgraves, 2005; Erickson, Lind, Johnson, & O'Barr, 1978). Therefore, aggressive communication, as a style lacking these features, may be more powerful in comparison to non-aggressive language.

Although many previous studies on aggressive communication were conducted in offline environments, aggressive communication is more often than not observed in online environments, such as blogs or social network conversations. Research on computer-mediated communication (CMC) has shown that emotional language is more likely to be used in CMC than in interpersonal communication (Tu, 2002). A number of CMC theories support this finding, such as media richness theory and social presence theory (Walther, 2011). In order to deliver attitude and emotion, online communicators are thus more likely to talk emotionally and use aggressive language (Derks, Fischer, & Bos, 2008). This finding has also been observed in the health domain, such as in the anecdotal evidence listed above. As such, it provides the rationale for us to focus on the styles of vaccine argument as they occur on the Internet.

Polite Communication

The literature on polite communication and similar concepts illustrates the value of politeness in effective communication. *Verbal politeness* is described as a "type of linguistic behavior that concentrates primarily on the *alter* and his/her image" (Held, 1989, p. 170). The core of polite communication is the consideration of one's audience. This section reviews

concepts related to polite communication as well as the effects polite communication.

Politeness theory (Brown & Levinson, 1987) has provided a broad framework that covers the basic rationale and impact of polite communication. Specifically, the theory explains how an individual's *face*, "the positive social value a person effectively claims," (Goffman, 1967, p. 5) may be threatened or honored during a communication interaction. For example, Brown and Levinson (1987) argued that speech and communication interactions are face-threatening acts (FTA). More specifically, the theory identifies two types of faces that individuals desire: positive face (having personal social identity accepted by others) and negative face (having the autonomy to do things and receive respect). The theory suggests that politeness can help mitigate threats to face and, in turn, help the communicator–audience relationship. The research also notes that four types of approaches may be available to reduce face threats using different levels of politeness from low to high: The first and lowest is to use the direct approach without any redress (bald on record); second is to use in-group or informal language to present a group-accepted identity (positive face redress); third is to minimize the imposition of an individual's autonomy (negative face redress); the fourth and highest is to do FTA by trying to address the issue indirectly (off record) (Brown & Levinson, 1987). Using an appropriate level of politeness allows a communicator to be more persuasive and build stronger relationships with his or her audience (Goldsmith & MacGeorge, 2000). Similar to politeness, literature on controlling message has also indicated that a low-controlling message, which uses more implicit and indirect language or qualifiers such as "maybe" and "perhaps," tends to be less forceful and more polite (Miller et al., 2007). Meanwhile, the concept of niceness is also relevant to polite communication. In the communication styles inventory proposed by De Vries et al. (2011), niceness is considered the opposite of verbal aggressiveness. Although niceness is not clearly

defined, De Vries et al. (2009) identify a list of highest loading adjectives and verbs that can represent niceness, such as softhearted, polite, friendly, etc. They also conclude that niceness includes components of "friendliness (vs. unfriendliness), uncriticalness (vs. argumentativeness), modesty, and cheerfulness" (p.18).

Another related concept in existing literature is *warm communication*. For instance, The warm verbal communication tactics used by healthcare providers—such as the use of friendly language to encourage a patient's involvement or show caring (Boggs, 1999), are similar to the approaches in politeness theory. Similarly, researchers have also discussed warm communication tactics in customer service contexts, such as expressing concern, friendliness, empathy, or compassion (Webster & Sundaram, 2009).

Overall, based on the acts from politeness theory, polite communication is comprised of two important components: peaceful utterance (vs. intense emotion in aggressive communication) and closeness (vs. attack on persons). In the current study we define *polite communication* as a style that uses warm language with the attempt to reinforce recipients' autonomy or build closeness with them.

Politeness theory was originally developed for the study of interpersonal communication contexts (Brown & Levinson, 1987; Goldsmith & MacGeorge, 2000), but a few studies have applied the theory to mass communication. In these mass communication studies, politeness was found to be an important factor in the effectiveness of communication. A recent study in which an off-record (not directly confronted) approach was found to be more favored than others demonstrates the effectiveness of politeness strategy in advertising message design (Pishghadam, 2012). Another applied politeness into health message framing and found that offering the "freedom of choice" in skin cancer information can mitigate readers' psychological reactance

(Shen, 2014). In the current study, we similarly apply politeness in a non-interpersonal context where the communicator no longer has only one specific role and the hearers can also be broader audiences.

According to politeness theory, politeness often leads to a higher rate of audience acceptance (Brown & Levinson, 1987). Psychological reactance theory (S. S. Brehm & Brehm, 2013) also predicts that polite messages are more effective with audiences because they are less likely to intrude on an individual's autonomy and, thus, the message is more likely to be accepted. For example, some studies on teacher–student communication showed that the politeness of a teacher's request could diminish student resistance to said request (Ball & Goodboy, 2014; Zhang & Sapp, 2013).

A number of studies also showed that approaches similar to negative and positive face redress can achieve positive communication effects in different contexts. For instance, similar to the approach of negative face redress, researchers who investigated the intervention style of video doctors found that collaborative language (e.g., the act of asking permission) versus restrictive language (e.g., the act of demanding) enhances patients' perceptions of personal control as well as receptivity to the video doctor's message (Gerbert et al., 2003). Similar to positive face redress, research on teachers' immediacy behavior indicated that, besides nonverbal behavior, verbal behavior such as humor or providing feedback can also enhance immediacy between the teacher and students (Allen, Witt, & Wheeless, 2006; Arbaugh, 2001). Moreover, researchers found that warm communication can enhance customers' experience of a given service (Webster & Sundaram, 2009).

Yet, because polite messages are often perceived as more vague and indirect, audiences may find them more ambiguous (Miller et al., 2007), which may contradict the purpose of the

communication. As discussed earlier in aggressive communication, “polite forms” may also jeopardize the power of speech, which directly influences the persuasion effect (Blankenship & Holtgraves, 2005; Erickson et al., 1978; Jenkins & Dragojevic, 2011).

In sum, aggressive and polite communication styles are normally discussed in different bodies of literature, and seem to represent two opposing styles of communication. Nevertheless, they are often compared with the neutral condition in experimental studies but not with each other. After reviewing the existing studies and examining the effects of both communication styles, we might generally conclude that aggressive communication may be beneficial for adding entertainment value, as well as enhancing the power of a message to some extent, but that it can also weaken audiences’ impressions of the communicator and his or her message. On the other hand, polite communication can be beneficial to the relationship between communicator and interlocutor, but may be too vague to have the intended effect, which may also weaken the power of the message.

Although we did not specify the neutral style in this review, it is included in the current study as a control condition that is neither aggressive nor polite. The rationale of having a neutral communication style is so we can better manipulate communication style and so the aggressive condition won't be mistaken as the impolite condition, or vice versa. Based on the discussion above, we go on to propose the outcomes of the study and hypothesize the effects of aggressive and polite communication styles on several specific outcomes in the study.

Hypotheses and Research Questions

The literature on both aggressive and polite communication indicates that exposing audiences to different styles of discourse can have different effects—both positive and negative—on audiences’ attitudes toward the message and the author. Our hypotheses are

designed to examine the effects on audience attitudes toward both the message and the writer in terms of child vaccination.

First, *perceived message quality* is described as the strength of arguments perceived by audiences, which is determined by the amount of primarily favorable thoughts readers elicit from the argument (Cacioppo, Petty, & Morris, 1983; Lavine & Snyder, 1996). In other words, *message quality* is the extent to which readers find an argument compelling, believable, and/or convincing. Based on the research above, it is predicted that different communication styles will influence readers' attitudes differently. However, while previous studies have provided evidence on both the positive and negative effects of aggressive and polite styles, the directions between communication style and message quality in the current study is unclear. We are interested in whether aggressive or polite communication style may lead to higher level of perceived message quality. Therefore, we ask the research question:

RQ1: *To what extent does communication style (aggressive, neutral, polite) affect perceived message quality?*

Second, a communicator's *likability* is described as the degree of favorable attitude an audience has toward a communicator (Chaiken, 1980). Likability, like perceived message quality, is considered an important indicator of the efficacy (persuasiveness) of a message (Reysen, 2005). In this regard, a favorable attitude toward the communicator has been found to positively influence message acceptance and attitude change (Whaley & Wagner, 2000). Therefore, we also consider writer likability as an outcome in this study. As opposed to the mixed findings on perceived message quality, previous studies pointed to relatively clearer outcomes regarding the effect of these two communication styles on audience's perceptions of communicators: polite styles lead to higher levels of likability, while aggressive styles lead to reduced levels of

likability. For instance, as reviewed earlier, warm language is positively associated with care and compassion on the part of the seller in customer service (Webster & Sundaram, 2009). Another study on teacher-student relationships found that instructors are seen as less likeable if he or she is perceived to be verbally aggressive in communication with students (S. Myers, 2001). Mutz and Reeves (2005) note that, although uncivil messages may be viewed as more interesting and entertaining, these messages still have adverse effects on how audiences perceive the communicator, particularly in terms of trust. Therefore, we predict:

> **H1:** *Communication style will have a direct relationship with writer likability. More specifically, readers will rate writers with a polite communication style as most likable, followed by one with a neutral communication style, followed by one with an aggressive communication style.*

Moreover, the goal of this study is not only to answer the question of how communication style influences risk communication, but also why. Therefore, we use *expectancy violation theory* (EVT) (Burgoon & Hale, 1988) to see if this approach can help make sense of the hypothesized effects of aggressive and polite communication.

Expectancy Violation Theory

We acknowledge that previous researchers have used a variety of theories to explain the effects of communication tones or styles on audience perception of communicator and message. In the current study, we adapt expectancy violation theory (EVT) (J. Burgoon & Hale, 1988) as a critical lens for understanding why aggressive or polite communication styles affect readers' attitudes, as it appeared to be a successful mediator in our previous investigation. EVT states that individuals have expectations for the behaviors of others and that the violation of these expectations can change arousal and thus accelerate attitude and behavior change. Expectation

violations can either be positive or negative, and the corresponding shift in attitude or behavior can go in either direction as well. In the context of the current study, it is hoped that assessing expectation violations may help explain why aggressive and polite communication styles can cause both negative and positive effects if such effects occur. In other words, EVT is used in the current study to determine if this concept can help explain why aggressiveness and politeness may matter in communication. Another theory that has often been used in aggressive communication studies is *psychological reactance theory*, which describes how individuals react when persuasive messages threaten the degree of freedom they have in a given situation (J. W. Brehm, 1966). It considers emotion or cognitive reactance as an explanation for attitude difference in different message conditions. The findings in studies that utilize psychological reactance theory do not contradict those of expectancy violation theory. Indeed, psychological reactance and expectation do not seem to be mutually exclusive. The current study only focuses on investigating the effects of expectation violation, and leave the possible effects of psychological reactance open to future study.

Although EVT initially focused on non-verbal behavior in interpersonal communication contexts, a number of studies have successfully applied the theory to mediated communication (Bevan, Ang, & Fearns, 2014; Ramirez & Wang, 2008). Language Expectancy Violation (LET) explained the similar concept to EVT with verbal behavior (M. Burgoon & Miller, 1985). What is important to understand is that, underlying the theory of EVT is the idea that people have normative expectations for what a source may or may not say in persuasive discourses and that violations of these expectations often trigger attitudinal or behavioral change (M. Burgoon & Miller, 1985). Previous studies also successfully applied EVT in written communication (i.e.

Johnson, 2012), providing support for the use of EVT as the theoretical foundation of the current study.

The essential tenet of EVT is that the arousal triggered by expectancy violations can be either positive or negative. Previous researchers illustrated that the valence of violation influences the ways individuals evaluate and interpret certain communication behaviors and messages. Positive violations, which occur when the communicator's perceived quality of behavior exceeds anticipated actions, tend to lead message receivers to evaluate the message or behavior more desirably way than negative violations, as the undesirable behavior characteristically falls short of receivers' expectations. In terms of communication style, M. Burgoon and Miller (1985) framed aggressive messages as one proposition that may negatively violate an individual's expectation. However, the researchers also stated that, if readers are expecting an intense message, receiving a moderate one (i.e., polite messages) will result in a positive violation (M. Burgoon, Denning, & Roberts, 2002). Moreover, in regards to swearing, Johnson (2012) found that the valence of expectancy violation is positively related to the effectiveness of the perceived message and audience perceptions of a speaker.

For the purposes of effective communication, positive violations produce more effective interactions when compared to negative violations, which are often seen as detrimental to the effectiveness of the communication (Bonito, Burgoon, & Bengtsson, 1999; J. K. Burgoon & Poire, 1993). Therefore, in the current study, it is argued that the level of perceived expectancy violation would further shift message receivers' attitudes according to the level of perceived expectancy violation. Based on the aforementioned literature on aggressive and polite communication styles, we predict that:

H2a: *Expectancy violation will mediate the relationship between communication style and message quality. Specifically, an aggressive message style is most likely to violate expectations, followed by neutral style and polite style; and this expectancy violation will be negatively associated with the message quality; b) writer likability.*

H2b: *Expectancy violation will mediate the relationship between communication style and writer likability. More specifically, an aggressive message style is most likely to violate expectations, followed by neutral style and polite style; and this expectancy violation will be negatively associated with writer likability.*

Attitude toward the Issue

As previously mentioned, there are many factors at play in the disagreement surrounding child vaccination, hence the great need for effective risk communication. However, whether or not someone believes children should be vaccinated (attitude toward vaccination) should also be expected to affect how individuals respond to such communication. In this regard, individuals' feelings of correctness are often enhanced when a person's beliefs are consistent with a message (Goethals & Nelson, 1973). In recent years, risk communication scholars have studied this phenomenon in the context of motivated reasoning. Motivated reasoning is described as the tendency of people to conform information they encounter to goals that lead to their desired conclusions (Kahan, 2015; Kunda, 1990). People who are motivated to be accurate in their beliefs are likely to devote more cognitive effort to defending those beliefs (Kunda, 1990). Therefore, people who strongly agree with a certain argument may be more likely to have stronger reactions to the message being communicated. In the context of this study, we argue that parents who agree with the author on supporting child vaccination will have different responses to the message compared to parents who disagree.

The influence of an individual's attitude or perception toward specific issues is often discussed in the field of political communication. For example, a number of studies have found that agreement with a political candidate's belief is an important factor influencing candidate appraisal (Brashers, 2001; Druckman, 2003; Holtgraves & Lasky, 1999). Additionally, literature on *value similarity* suggests that people tend to base their judgment of communicator trustworthiness on whether or not they share the same values, rather than basing that judgment on evidence of reasoned arguments or knowledge, especially in complex social-technical circumstances (Earle & Cvetkovich, 1995; Poortinga & Pidgeon, 2003; Siegrist, Cvetkovich, & Roth, 2000). In the current context, it should be expected that an individual's judgment of the message can be influenced by the extent to which they believe that share similar values or opinions with the communicator on child vaccination.

Meanwhile, a number of studies also interacted attitude or perception toward specific issues with other factors. One study showed that issue agreement appears to be a significant covariate between the power of a message (tentative vs. assertive) and an audience's perception of a candidate (Holtgraves & Lasky, 1999). Another study examining the interaction effect between explicit and implicit communication styles and value similarity found that a counselor's explicit communication style is rated as more attractive and trustworthy when clients agree with the counselor's stated value (Lewis & Walsh, 1980). Therefore, in the current study, we argue that audience's agreement with the author on the issue also likely serves as an important factor moderating the relationship between communication style, expectancy violation and attitude outcomes. More specifically, we argue parents' attitude toward child vaccination (also the opinion of the author) will influence how they perceive the persuasiveness of a message with different communication styles. Based on previous studies, we predict that, when an individual

has a more negative attitude toward an issue, an aggressive message may increase the effect of violation, and decrease the level of perceived message quality and writer likability.

H3: *Attitude toward child vaccination will moderate the relationship between communication style and expectancy violation. The relationship between communication style and expectancy violation will be stronger with the increase of positive attitudes toward child vaccination.*

H4a: *Attitude toward child vaccination will moderate the relationship between communication style and message quality. More specifically, individuals who agree with vaccination may find polite message with higher level of perceived message quality; individuals who less agree with vaccination may find aggressive message with lower level of perceived message quality.*

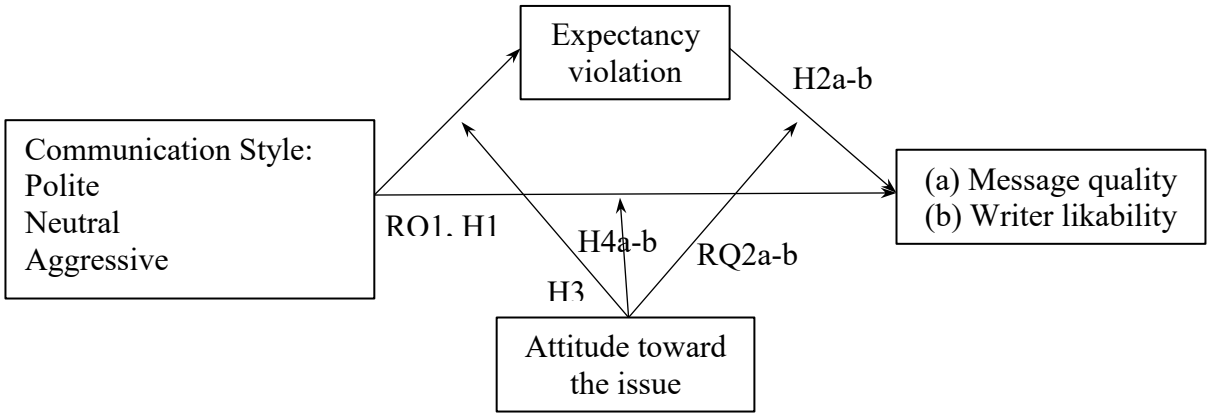
H4a: *Attitude toward child vaccination will moderate the relationship between communication style and writer likability. More specifically, individuals who agree with vaccination more may find the writer of polite message more likable; individuals who agree with vaccination less may find the writer of aggressive message less likable.*

However, the level of positive or negative expectancy violation may affect perceived message quality and writer likability differently, it is difficult to predict the effect of attitude in the relationship between expectancy violation and the outcomes. Therefore, we propose a research question instead:

RQ2a-b: *To what extent does attitude toward child vaccination moderate the relationship between expectancy violation and (a) message quality, (b) writer likability?*

The theoretical model for the first study is presented below.

Figure 1. Theoretical framework of study one.



STUDY ONE: METHOD

An experiment using a between-subject design with three conditions (aggressive, neutral, and polite style) was planned to test the effects of different communication styles on audience perception of communicator and message while assessing individual expectation violations and agreement with child vaccination in the context of vaccine communication. This experiment was conducted online through Qualtrics with participants from Amazon's Mechanical Turk (mTurk).

Sample

To ensure participants were potential audiences of child vaccination information, parents were selected to participate if they had a child or children between 0 and 7 years of age, the suggested age range for the MMR vaccine according to the CDC (CDC, 2015). To avoid the potential culture differences across countries, the study only focused on the U.S. population. Although mTurk participants may not represent the whole U.S. population, prior research shows that mTurk participants in the U.S. fall into the age range we expect for parents, and that the gender distribution is close to even. The income of the U.S. mTurk population, however, is relatively lower compared to that of the general U.S. population (Ross, Irani, Silberman, Zaldivar, & Tomlinson, 2010). The data was cleaned and filtered before data analysis. Answers from those who failed to respond to the attention check question and successfully recall the author's attitude in the issue were removed from the dataset. A total of 288 participants finished the survey. Monte Carlo simulation was used to calculate sample size as recommended for latent variable models (Muthén & Muthén, 2002). As expected, the number of participants satisfied the sample requirement from power analysis.

The average age of participants was 34 (*SD* = 9.53). 57% of participants were female. The majority of participants were white (77%), followed by African American (7%), Asian (6%),

and others. 5% of participants were Hispanic or Latino. 40% of participants received a bachelor's degree, 31% received some college education, 14% received a master's degree, and 9% of received a high school education. 107 parents reported only having one child, and 126 parents reported that they have two or more than two children.

Stimuli

A short blog article (about 450 words) from the Internet targeting parents who do not want to vaccinate their children was used as one of the stimuli in the study. We treated the original article (with limited editing) as the aggressive condition ("To dumb parents who do not vaccinate their children," 2015). This article was then modified by removing aggressive elements such as attacks on specific targets (Infante & Wigley III, 1986) to serve as the neutral condition. Based on the politeness strategies proposed by Brown and Levinson (1987), the article was similarly modified into a polite version for the polite condition. For example, the initial sentence of the original article (aggressive condition) reads: "It's amazing how a combination of poor information and anecdotal evidence can prey on the weak minded among us. Today's hate is about the rise of STUPID parents who, because of their inability to form rational thought, are now depriving their children of vaccines." The opening sentence of the neutral condition is: "It's unbelievable how a combination of poor information and anecdotal evidence can influence people. Today's column is about the rise of parents who, because of their unskeptical acceptance of poor quality information, are now depriving vaccines for their children." The opening of the polite condition is: "It's concerning how a combination of poor information and anecdotal evidence can influence even our closest friends. Today's column is about the rise of parents who, because of a trusting acceptance of information, are now not providing vaccines for their children." The rest of the article was also revised using the same approach. The three conditions

were pre-tested with a text analysis software Linguistic Inquiry and Word Count (LIWC) to ensure the manipulation of communication style was effective. The results on several relative keywords such as “anger” “certain” “power” showed differences among three message styles (Appendix 4).

Procedure

Participants were invited to answer five screening questions, such as gender and age. One of the questions asked whether all their children were above the age of 7. This was meant to mask the purpose of the study in order to avoid participants selecting the desired response. Participants received 5 cents for the pre-screening questions, and participants who passed the screening questions and finished the main study received $0.45 as extra incentive. Eligible participants were asked to read an informed consent form. They were then directed to a page saying they were being asked to help to assess a communicator’s writing by evaluating an article related to child vaccination. Before viewing the article, participants were asked to answer a set of questions related to their attitude toward child vaccination as well as a set of questions on their past decisions regarding vaccinating their child(ren). Participants were then randomly assigned to one of the three conditions. After reading the blog article, they were asked a series of questions. The questionnaire contained assessments of participants’ perceived aggressiveness, perceived politeness, expectancy violation, perceived quality of the message and likeability of the author. They were thanked and debriefed at the end. A total 1,404 mTurk participants answered the prescreen questions, and 288 of them were eligible and completed the whole questionnaire online. On average, each participant spent 10 minutes (SD = 5.85) to finish the survey.

Measurement

Attitude toward vaccination was captured by three items: “negative/positive” “bad/good” “unfavorable/favorable” (MacKenzie, Lutz, & Belch, 1986). Message quality was measured by a seven item scale including questions such as: “believable/unbelievable, compelling/not compelling, convincing/unconvincing,” etc. (Hullett, 2002). The items for expectancy violation were adopted from J. Burgoon and Walther (1990). Moreover, we modified the initial items of expectancy violation (which did not indicate the direction of violation) by specifying either positive or negative violation for manipulation check. We measured both as manipulation check, such as “the author’s writing was too aggressive/polite as a writer” or “the author used an abnormally polite/aggressive writing style for a communicator” (reversed) (Results reported in Table 1). Writer likability was captured by seven items: “If I were to meet a writer like the author of the article, I would expect him to be a) friendly, b) likable, c) warm, d) approachable, e) similar to me; f) worth asking for advice; g) knowledgeable” (Reysen, 2005). The detailed items are listed in Table 1.

Data Analysis

We used both SPSS and Mplus to conduct the data analysis. To build the mediated moderation model and analyze the data, we used structural equation modeling with Mplus. We first built and tested the fit of the measurement model with all latent variables. We then built the model with the path of each hypothesis based on this conceptual model with message quality and writer likability as the dependent variables, expectancy violation as the mediator, and attitude toward vaccine as the moderator.

STUDY ONE RESULTS

Manipulation Check

The manipulation check questions on individual's perceived aggressiveness and politeness were asked during the main test. An ANOVA test showed a significant difference between aggressive, neutral and polite messages in terms of perceived aggressiveness ($F(2,285) = 81.27$, $p < .01$, $\eta^2 = .36$). On a seven-point scale, respondents reported that the aggressive blog message was substantially more aggressive ($M = 6.04$, $SD = 1.13$), followed by the neutral message ($M = 4.97$, $SD = 1.18$), and the polite message ($M = 3.85$, $SD = 1.27$). The difference in perceived politeness is also significant ($F(2,285) = 81.27$, $p < .01$, $\eta^2 = .43$), as respondents reported that the polite message was substantially more polite ($M = 4.68$, $SD = 1.16$), then the neutral message ($M = 3.33$, $SD = 1.35$), and the aggressive message ($M = 2.05$, $SD = 1.23$). Similarly, respondents reported that the aggressive blog message violated individual's expectation of aggression the most ($M = 5.39$, $SD = 1.29$), followed by the neutral message ($M = 4.08$, $SD = 1.36$), and the polite message ($M = 2.88$, $SD = 1.23$); and respondents reported that the aggressive blog message violated individual's expectation of politeness the least ($M = 1.76$, $SD = .92$), followed by the neutral message ($M = 2.70$, $SD = 1.13$), and the polite message ($M = 3.82$, $SD = 1.10$). ($F(2,285) = 46.55$, $p < .01$, $\eta^2 = .25$). Detailed results are reported in Table 1. Overall, the manipulation of the current study was successful.

Table 1. Means and standard deviation for each scale, as well as ANOVA by condition.

	Overall M(SD)	**Aggressive M(SD)**	**Neutral M(SD)**	**Polite M (SD)**	**F(Eta squared)**
In general, what is your attitude toward child vaccination? Negative / Positive Bad / Good Unfavorable / Favorable **Attitude toward Vaccine** (α=.98)	6.03(1.59)	5.99(1.62)	6. 01(1.61)	6.11(1.57)	.15(.00)
Considering both content and style, how aggressive would you say this article was (Not all aggressive/Very aggressive) And would you say the article was … (Not aggressive enough/Too aggressive) **Perceived Aggressiveness** (α=.75)	4.95(1.49)	6.05(1.13)[a]	4.97(1.18)[b]	3.85 (1.27)[c]	**81.27**[**](.36)
Considering both content and style, how polite would you say this article was (Not all polite/Very polite) And would you say the article was … (Not polite enough/Too polite) **Perceived Politeness** (α=.84)	3.36(1.64)	2.05(1.16)[a]	3.33(1.35)[b]	4.68 (1.23)[c]	**106.79**[**](.43)
And with regard to the scientist who wrote the article: The scientist's writing was appropriate for a scientist. (reversed) The scientist wrote the way that I would expect most scientists to write. (reversed) The scientist used a normal writing style for a scientist. (reversed) The scientist's writing was unusual for a scientist. **Expectation Violation** (α=.91)	4.78(1.60)	5.78(1.60)[a]	4.73(1.18)[b]	3.84(1.34)[c]	**46.55**[**](.25)
The writer used an aggressive writing style for a blog writer. The writer's writing was overly aggressive for a blog writer. The writer was too aggressive as a blog writer. The writer wrote in a really aggressive way that I would not expect most blog writers to do. **Aggressive violation** (α=.93)	4.11(1.65)	5.38(1.29)[a]	4.08(1.36)[b]	2.88(1.23)[c]	**89.58**[**](.39)

Table 1 (cont'd)

The writer used a polite writing style for a blog writer.					
The writer's writing was overly polite for a blog writer.					
The writer was too polite for a blog writer.					
The writer wrote in a really polite way that I would not expect most blog writers to do.					
Polite Violation (α=.92)	2.77(.135)	1.76(.92)[a]	2.70(1.13)[b]	3.82(1.10)[c]	**91.07**[**](.39)
To what extent do you feel the article is __?					
Unbelievable / Believable					
Unconvincing / Convincing					
Not compelling / Compelling					
Illogical / Logical					
Implausible / Plausible					
Unreasonable / Reasonable					
Not sound / Sound					
Message Quality (α=.96)	5.39(1.49)	4.88(1.49)[a]	5.54(1.57)[b]	5.74(1.28)[b]	**9.23**[**](.06)
Now that you have read the article, do you think the author of the article would be …					
Not at all friendly / Very friendly					
Not at all likable / Very likable					
Not at all warm / Very warm					
Not at all approachable / Very approachable					
Not at all similar to me / Very similar to me					
Not at all worth asking for advice / Very worth asking for advice					
Not at all knowledgeable / Very knowledgeable					
Writer Likability (α=.95)	4.30(1.51)	3.43(1.41)[a]	4.27(1.41)[b]	5.19(1.17)[c]	**41.42**[**](.23)

Notes: n = ~288. [+]df1 =2, df2 =285. All questions were asked using seven point scales.
a,b,c indicates the significance of post-hoc analysis. [**]:p<.01.

Measurement Model Fit

To test the measurement model fit, we conducted a confirmatory factorial analysis by constraining the factor loadings, residuals, covariances and regressions to be equal across different groups. The fit indexes of the measurement model for the overall model served as the baseline model. The fit indexes suggest that the model fitted the data adequately (χ^2 (183) = 1024.38, $p < .00$; CFI = .98, TLI = .98, RMSEA = .12). The loading of the items is reported in in Table 2.

Table 2. Unstandardized factor loading of measurement scales in model test of study one.

	Estimate	S.E	P value
Pre-attitude			
F1: Negative / Positive	1.00	.00	999.00
F2: Bad / Good	1.04	.02	.00
F3: Unfavorable / Favorable	1.03	.03	.00
Expectation Violation			
F1: The scientist's writing was appropriate for a scientist. (R)	1.00	.09	999.00
F2: The scientist wrote the way that I would expect most scientists to write. (R)	.96	.03	.00
F3: The scientist used a normal writing style for a scientist. (R)	.92	.03	.00
F4: The scientist's writing was unusual for a scientist.	.81	.03	.00
Message Quality			
F1: Unbelievable / Believable	1.00	.00	999.00
F2: Unconvincing / Convincing	.99	.02	.00
F3: Not compelling / Compelling	.97	.02	.00
F4: Illogical / Logical	1.04	.02	.00
F5: Implausible / Plausible	.99	.02	.00
F6: Unreasonable / Reasonable	1.05	.02	.00
F7: Not sound / Sound	1.04	.02	.00
Writer Likability			
F1: Not at all friendly / Very friendly	1.00	.00	999.00
F2: Not at all likable / Very likable	1.01	.01	.00
F3: Not at all warm / Very warm	.95	.01	.00
F4: Not at all approachable / Very approachable	.093	.01	.00
F5: Not at all similar to me / Very similar to me	.83	.02	.00
F6: Not at all worth asking for advice / Very worth asking for advice	.91	.02	.00
F7: Not at all knowledgeable / Very knowledgeable	.99	.02	.00

Notes: n = ~288. (R): reserved.

Hypotheses Test

We used structural equation modeling to answer the rest of the hypotheses and research questions. First, the fit indexes of the full model show that the model fit the data adequately (χ^2 (201) = 11180.12, p = .00; CFI = .96, TLI = .95, RMSEA = .12).

RQ1 and H1 predicted the direct relationship between communication style and message quality and writer likability. The result of the ANOVA test showed a significant difference between aggressive message style and the neutral and polite style (F(2,285) = 9.23, p < .01, η^2 = .06), without controlling the effect of expectancy violation. The aggressive message was perceived with less quality (M = 4.88, SD = 1.49) than the neutral (M = 5.54, SD = 1.57) or polite message (M = 5.74, SD = 1.28). No significant difference was observed in terms of perceived message quality between neutral message polite message styles. Respondents also rated perceived writer likability differently in the three conditions (F(2,285) = 41.42, p < .01, η^2 = .23). Respondents who read the aggressive message found the writer least likable (M = 3.43, SD = 1.41), followed by the neutral message (M = 4.27, SD = 1.41), and polite message (M = 5.19, SD = 1.17), which suggest that H1 is supported (Table 1).

H2a-b proposed the mediation effect of expectancy violation between message style and (a) message quality and (b) writer likability. We first conducted two ANOVA tests to examine the valence of expectancy violation. The ANOVA tests on the valence of expectancy violation showed that individuals found that writer of aggressive message was overly aggressive (N = 5.38, SD = 1.29), then the writer of neutral message (M = 4.08, SD = 1.36), but not with the writer of polite message (M = 2.88, SD = 1.23) (F(2,285) = 89.58, p < .01). Meanwhile, individuals in polite message condition slightly agreed that the writer was overly polite (N = 3.82, SD = 1.10), but not with writer of the neutral condition (M = 2.70, SD = 1.13), nor

aggressive condition (M = 2.70, SD = 1.13) (F(2,285) = 89.58, p < .01). The comparison confirmed that the polite message can positively violate individual's expectation while aggressive message can negatively violate individual's expectation. Next, we tested the mediation effect: First, the results of the SEM test showed that message style has a positive effect on expectancy violation when controlling for the indirect effect and residual covariance between message quality and writer likability (β = 1.11, p < .01). In other words, participants who read the aggressive message are more likely to experience a violation of expectation, followed by the neutral message, and the polite message. Second, expectancy violation had a significantly negative effect on both message quality (β = -.36, p < .01) and writer likability (β = -.47, p < .01), which suggests that, the more participants experienced expectation violation, the lower they perceived the message quality and writer likability. Furthermore, message style had no statistically significant effect on message quality (β = -.02, *n.s*) and had a significantly negative effect on writer likability (β = -.63, p < .01). Therefore, the results of the mediation analysis show that expectancy violation partially mediates the relationship between message style and writer likability, and fully mediates the relationship between message style and message quality. In other words, expectancy violation explains how aggressive messages lead to more negative outcomes, while polite messages lead to more positive outcomes. Thus, the findings support H2a-b.

H3 predicted that an individual's pre-existing attitude toward the issue (child vaccination in the current study) would moderate the relationship between communication style and expectancy violation. The SEM results showed that an individual's pre-existing attitude has a significantly negative effect on expectancy violation (β = -.41, p < .01), which means that, when individuals had more favorable attitudes toward child vaccination, they were less likely to

experience expectation violation after viewing the article on vaccination. Moreover, together with communication style, attitude also had a positive interaction effect on expectancy violation (β = .13, p = .05), which suggests that, with an increase in positive attitude toward vaccination, the expectancy violation gap between a polite message style and aggressive message style is increasing. Parents who agree with child vaccination found aggressive message more likely to violate their expectation. As such, the findings support H3.

RQ3a-b asked about the possible moderation effect of attitudes toward vaccination between message style and (a) message quality as well as (b) writer likability. Although the results showed that attitude has a direct, positive relationship with message quality (β = .40, p < .01) and writer likability (β = .36, p <. 01), no interaction effects were observed between communication style and attitude on perceived message quality (β = -.02, *n.s*) nor writer likability (β = -.01, *n.s*) (Table 2).

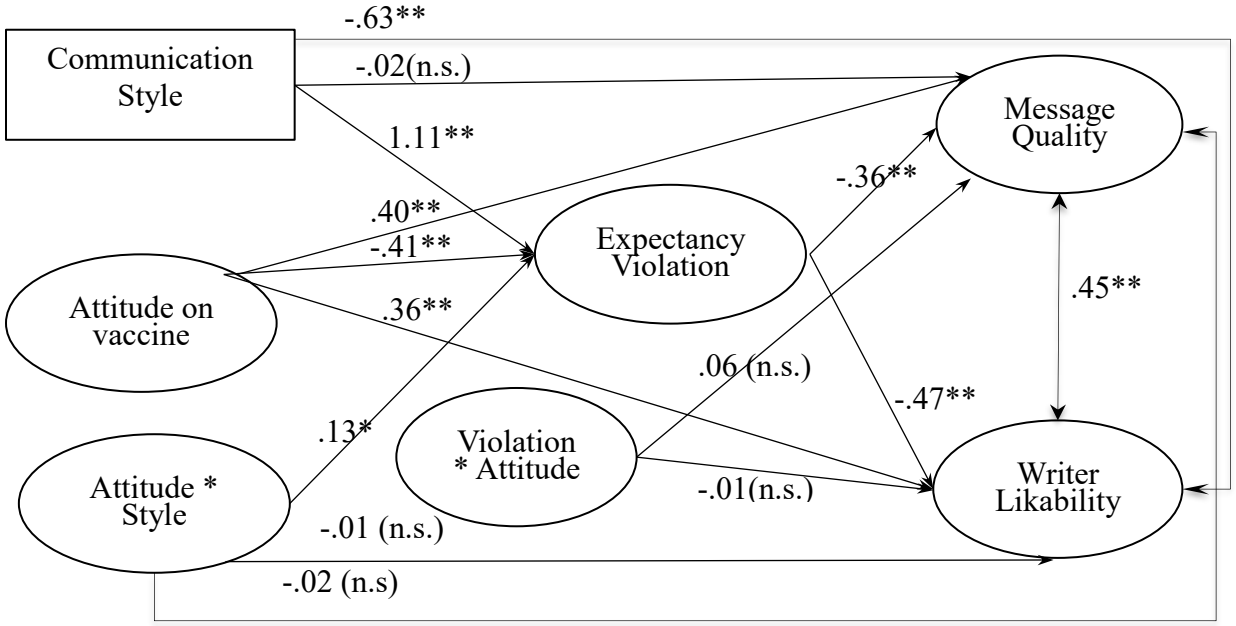
Lastly, RQ2a-b asked about the possible moderation effect of attitudes toward vaccination between expectancy violation and (a) message quality, (b) writer likability. Although the results showed that attitude has a direct, positive relationship with message quality (β = .40, p < .01) and writer likability (β = .36, p <. 01), no interaction effects were observed between expectancy violation and attitude on either message quality (β = .06, *n.s*) or writer likability (β = -.01, *n.s*). The simplified path diagram of this study's model is also presented below (Figure 2).

Table 3. Regression and covariance table of study one.

	Regression coefficients		Partial r^2
	USTD loading	STD loading	
Message style >> Expectancy violation	1.11**	.45	0.20
Pre-attitude >> Expectancy violation	-.41**	-.53	0.28
Style*Attitude >> Expectancy violation	.13*	.12	0.01
Pre-attitude >> Message quality	.40**	.50	0.25
Message style >> Message quality	-.02	.10	0.01
Expectancy violation >> Message quality	-.36**	-.52	0.27
Style*Attitude >> Message quality	-.02	.01	0.00
Violation*attitude >> Message quality	.06	.08	0.01
Pre-attitude >> Writer likability	.36**	.47	0.22
Message style >> Writer likability	-.63**	-.04	0.00
Expectancy violation >> Writer likability	-.47**	-.60	0.36
Style*Attitude >> Writer likability	-.01	-.06	0.00
Violation*attitude >> Writer likability	-.01	-.01	0.00
Writer likability with Message quality (covariance)	.45**	.38	0.14

Notes: n = ~288. **:p<.01, *:p<.05. r^2(quality) = .65, r^2(likability) = .57, r^2(violation) = .20.

Figure 2. Simplified path diagram of study one.



Notes: n = ~288. Communication style was coded as: polite =-1, neutral=0, aggressive=1. **:p<.01, *:p<.05, *n.s*: not significant.

STUDY ONE DISCUSSION

The current study strategically extends the research on communication style into a science and health communication context. Doing so is meant to enable researchers to better understand how communication styles can be used strategically in science communication, as well as provide researchers with the rationales behind the effect of each style. The current study also provides some practical implications for science communicators and suggests that communicators should be aware of the expectations audiences have for their speech style in order to implement an appropriate communication style strategy.

One of the most important findings from the current study is that different styles of communication affect communication outcomes in terms of effectiveness. The results showed that these communication outcomes are affected by the level of expectancy violation individuals perceived. In other words, the reason audiences find polite message more persuasive than aggressive message, and find polite communicators more likeable than aggressive communicators are because the aggressive message violates audiences' expectations in terms of the style of speech they expect the communicator to have. These findings are consistent with prior literature on expectancy violation theory that posit individuals will make corresponding shifts in their attitudes when they encounter some level of violation to their expectations. Although several previous researchers (Brooks & Geer, 2007; Mutz & Reeves, 2005) suggested some positive effects of aggression, such as enhancing the intensity of the argument, effects like these were not observed in the current study. Instead, study one showed that perceived message quality is fully explained by the level of expectancy violation individuals perceive. Similarly, the effects on writer likability are partially mediated by expectancy violation.

Another important finding from this study is the effect of an individual's pre-existing

attitude toward the issue on the relationship between communication style and the outcomes. Study one showed that most parents have a positive attitude toward vaccination, and the increase of positive attitude leads to better persuasion effect, which was consistent with findings from previous studies (Kahan, 2015). Yet, positive or not, attitude toward vaccination still affected how they processed messages with different communication styles. Participants with a higher positive attitude toward child vaccination found the pro-vaccination message less likely to violate their expectations, regardless of message style. Moreover, with an increase in positive attitude toward vaccination, the expectancy violation gap between a polite message style and aggressive message style is getting bigger. This finding may suggest that parents who already agree with the concept of child vaccination find aggressive message style unnecessary, have less tolerance for an aggressive style of communication and find it more likely to violate their expectations of the writer. In addition, parents who agree more with child vaccination found a pro-vaccination message more compelling, and they also found the writer more likable, regardless of message style. These findings support the statements by previous researchers on attitude and agreement with the communicator (Goethals & Nelson, 1973, Brashers, 2001). Specifically, the current study futher linked attitude with communication style in terms of evaluating the effective of communication mesages. Thus, communicators need to consider audiences' attitudes toward the topic before using intense language during communication, using polite style appears to be more effective with audiences who disagree with their opinions.

Although the current study only tested two outcomes and found that communication style has an effect The current sutdy also practical implictions for communicators to consider different communication objectives while facing different types of audiences, such as pro-vaccinist or anti-vaccinist, and decide what type of communication style would be more approparite.

Therfore, future study can expand the current line of research to examine the effects of communication style on other communication objectives related to child vaccination besides persuading parents to accept vaccines for their children, such as willinginess to promote vaccination or donate to related organizations.

STUDY TWO

The first study aimed to help researchers better understand the effects of polite and aggressive communication styles as mediated by expectancy violations. The second study adds the consideration of source because both the literature on expectancy violation theory and the literature on politeness theory raise source of communication as an important topic. Moreover, the second study focused on a second risk communication context—GMO use—in order to examine the generalizability of the previous findings in other risk contexts. Below, we discuss the need for examining this concept in the context of the GMO use debate. Then we further introduce the rationale for testing source expertise as a potential moderator that shapes effects of aggressiveness and politeness. Corresponding hypotheses are then proposed.

Debate in GMO Use

A recent survey from the Pew Research Center shows that only 37% of U.S. adults think foods made with genetically modified organisms (GMO) are safe. Moreover, more than half (67%) of adults believe that scientists do not fully understand the health effects of GMO products (Funk & Rainie, 2015, July). In contrast, 88% members of the American Association for the Advancement of Science (AAAS)—a leading scientific society and publisher of the journal *Science*—believe genetically modified foods are safe for consumption. A range of genetically modified crops are also, of course, grown in the United States with regulatory approval based on a range of health and environmental safety assessments (Fernandez-Cornejo, Wechsler, Livingston, & Mitchell, 2014; National Research Council, 2010). The contrast between public opinion and scientific consensus, which has resulted in substantial controversy (e.g., etc Group, 2016; Greenpeace, 2016), provides an opportunity to explore how strategic science communication decisions may shape the effects of communication.

Although there are no statistics showing how often different communication styles are used when talking about GMOs, a quick review of Internet content on the issue reveals a large number of aggressive arguments from both sides (e.g. Sarich, 2015, Jul; Schewitz, 2014, Oct). Therefore, this research focuses on assessing the potential effects of aggressive risk communication on public attitudes in ways that take perceived communicator expertise into consideration.

Source Expertise

Source expertise, the central subject of study two, is an important component in both expectancy violation theory and politeness theory. First, J. Burgoon and Hale (1988) proposed three factors that may result in expectancy violations: communicator characteristics, such as gender; relationship characteristics, such as status inequality and degree of acquaintance; and context, such as situational definition and formality (p.64). In the proposed project, the context is already manipulated to be a risk communication message about GMO products using different communication styles. Study two adds to the existing literature on the effect of communication style by consideration of communicator and relationship characteristics through source differences. Second, politeness theory (Brown & Levinson, 1987) also suggests that people may perceive advice differently depending on their relationship with the communicator. More specifically, advice from a speaker who has a high degree of power or is someone who may have a close relationship with the audience is less likely to threaten the audience's "face" (according to politeness theory) through communication. On the other hand, a less powerful speaker who does not have a close relationship with the audience would need to use higher levels of politeness strategy to reduce the level of perceived threat when he or she conducts face-threatening acts (Goldsmith & MacGeorge, 2000). We acknowledge that there are many aspects of source

characteristics and it is impossible to cover them all at once. Therefore, in the current study, we only focus on one important aspect: source expertise.

Discussions on source expertise are often derived from the classic communication variable *source credibility*, which still provides meaningful implications in modern communication research (For a review see Pornpitakpan, 2004). Researchers have conceptualized source credibility into two main aspects: *source expertise*, which refers to the level of knowledge or expertise a communication source obtains on the topic, and *source trustworthiness*, which describes the level of bias an audience holds toward certain conclusions about the topic (Mills & Jellison, 1967; Rhine & Severance, 1970). In many studies, both aspects have been found to result in positive effects on persuasion (i.e. Tormala, Briñol, & Petty, 2007; Yoo & Gretzel, 2008). Recent development in this area of research has focused on the effect of persuasion upon an array of other individual and situational factors, such as individuals' knowledge of the content (Eastin, 2001) and timing of source identification during communication (Nan, 2013).

Another area of research that covers source expertise is the concept of trustworthiness from organizational trust, which is made up of three components: *ability*, which is described as the skills or competences of the trustee in a certain domain; *benevolence*, which reflects the individual's belief that the other party represents and cares about their interests; and *integrity*, which describes how the other party adheres to certain principles that an individual accepts (Mayer, Davis, & Schoorman, 1995). In comparing the concept of source credibility and trustworthiness, we can see that source expertise is very similar to ability as it is defined in the literature on trustworthiness. Thus, competence, or expertise of the communicator, is acknowledged by researchers in both areas as an important factor for communication

effectiveness.

Researchers of communication style often focus on source credibility as a dependent variable. For example, research on linguistic intensity found that intensity appears to be an important factor that can increase (Hamilton, 1998) or decrease (Bradac & Mulac, 1984) perceived source credibility. Meanwhile, research on incivility found that exhibiting uncivil language jeopardized communicators' credibility from a readers' perspective (Thorson et al., 2010). However, there is a paucity of research that has considered the effect of a source as an influential factor in conjunction with communication style and persuasion. We believe there is a need to understand the effect of source differences in varying communication styles.

Moreover, EVT also provides the theoretical reason for examining the effect of source in the current study. EVT proposes that communicator characteristics (such as perceived competence) and the characteristics of the relationship between communicator and audience (such as status inequality) influence how individuals expect the communicator to behave. Therefore, EVT provides a general direction for how source expertise might influence the relationship between communication style and expectancy violation, but this relationship has not yet been tested in experiments by researchers.

As an initial attempt to include the effect of source in communication style, this study only focuses on source expertise. We plan to fully examine the effects of other aspects of source and communication style in future studies. Based on the definition of expertise from source credibility and the definition of ability from trustworthiness, we followed the definition of "source expertise" in the current study as *the level of skill or knowledge of the communicator individuals perceive.*

Previous literature has provided consistent evidence that source expertise is a significant

factor that positively influences the effect of persuasion. A meta-analysis on source effects in communication and persuasion research showed that expertise appears to have a relatively stronger effect on persuasion compared to other types of source manipulation (Wilson & Sherrell, 1993). The researchers explained the rationale for this finding by noting expertise is easier for individuals to assess, and thus more relevant to decision making for individuals. Moreover, from a psychological perspective (Maddux & Rogers, 1980; Wood & Kallgren, 1988) and an advertising perspective (Braunsberger & Munch, 1998), some researchers found that individuals tend to have more positive attitudes toward sources with high expertise.

Hypotheses and Research Questions

Study two shares the same outcomes as study one. In addition to the hypotheses and research questions on the relationship between communication style, expectancy violation and the outcomes (RQ1, H1, H2a-b) from study one, we raise more hypotheses and research questions (H5, H6) to test the moderating effect of source expertise.

Although exploration of the interaction between source expertise and communication style is still limited in previous studies on specific topics, there are some discussions between source credibility and style that may provide some guidance for our hypotheses development. For example, Czapiński and Lewicka (1979) found that messages that focus on the negative aspect of the information are more likely to be rejected than messages that focus on the positive aspect in conditions of low source credibility, while negative messages have higher impacts than positive messages in conditions of high source credibility. Another study on communication style showed that source credibility plays an important role in assertive language, where sources with high credibility appear to be more influential than sources with low credibility (Wegner, Wenzlaff, Kerker, & Beattie, 1981). Moreover, Hamilton et al. (1990) stated that language

intensity and source credibility interact in producing attitude change where the intensity of language may enhance the effect of high-credibility, but inhibit the effect of low-credibility. High source credibility may contribute positively to the effect of intense language, but low source credibility may jeopardize said effect. Since expertise is an important component of source credibility, we believe that source expertise may also interact with communication style in the production of attitude when source trustworthiness is controlled to be the same. Therefore, we hypothesize:

H5a*: Source expertise will moderate the relationship between communication style and perceived message quality. For example, aggressive message will lead to lower perceived message quality, while polite message will lead to higher perceived message in high expertise condition than in low expertise condition.*

Based on the consistent findings of how an aggressive communication style negatively affects writer likability, we predict that source expertise will also accelerate the effect of communicators' messages:

H5b*: Source expertise moderates the relationship between communication style and writer likability. For example, aggressive message will lead to lower perceived writer likability, while polite message will lead to higher writer likeability in high expertise condition than in low expertise condition.*

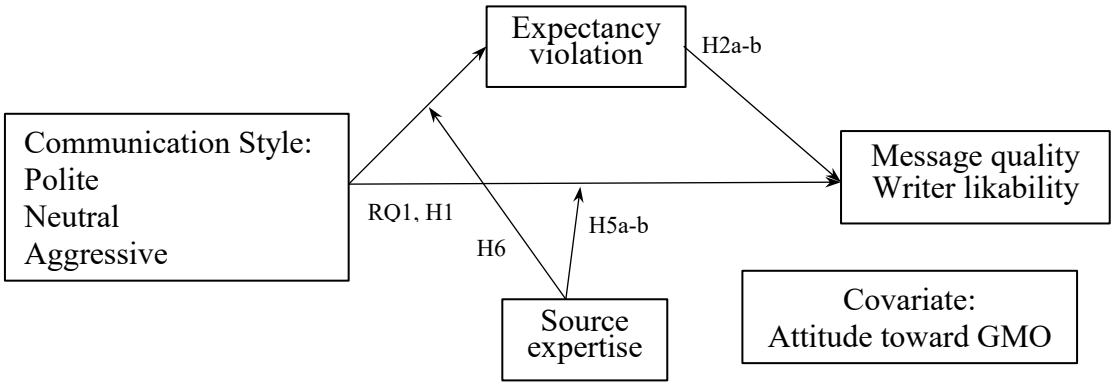
Similarly, we have discussed how aggressive messages may negatively violate an individual's expectations, and how polite messages may positively violate an individual's expectations. We expect that source expertise will accelerate this relationship as well:

H6*: Source expertise will moderate the relationship between communication style and expectancy violation. For example, aggressive message will lead to higher expectancy*

violation in high expertise condition than low expertise condition; while polite message will lead to lower expectancy violation in high expertise condition than low expertise condition.

We have discussed the importance of attitude toward message topic in understanding communication style in study one. Moreover, a previous survey from the UK showed that individuals' attitudes toward GMOs are the most salient factors influencing how they perceive its risks and benefits (Frewer & Miles, 2003). Therefore, we include attitude toward GMOs as a covariate in the model of study two. The theoretical model of study two is shown below.

Figure 3. Theoretical model of study two.



STUDY TWO METHOD

Study two mainly focused on the moderating effect of different levels of source expertise. Therefore, we employed a 3 (aggressive vs. neutral vs. polite) x 2 (expert vs. non-expert) between-subject factorial design. Attitude toward GMOs was included as a covariate in data analysis, as it appears to be an important factor from study one. This experiment was conducted online through Qualtrics with participants from Amazon's Mechanical Turk (mTurk). The current study also only focused on the U.S. population in order to avoid the differences in culture that exist across countries.

Sample

To make sure the participants are potential audiences of messages on the topic of GMO, the participants were restricted to readers of science or health news and grocery shoppers. The data was cleaned and filtered before the data analysis. Answers from respondents who failed to recall the author's occupation, or attitude toward the issue were removed from the dataset. A total of 416 participants finished the survey. They range in age from 19 to 83 with an average age of 48. 64% of participants are female. The majority of participants were white (79%), followed by African American (9%), Asian (6%), Hispanic or Latino (4%), and others (2%). More than half of the respondents received some college education (38%) or a bachelor's degree (36%); some received a master's degree (11%), and some received a high school or GED degree (10%). The majority of participants shop for groceries once to several times per week (82%), and more than half of the respondents "sometimes" read news about GMOs (63%).

Measurement

Study two used the same measurement scales from study one on expectancy violation, message quality, writer likability, attitude toward the issue. In addition, study two also included

measurement on expertise with five items: “expert” “experienced” “knowledgeable” “qualified” “skilled”, and trustworthiness with five items: “dependable” “honest” “reliable” “sincere” “trustworthy” (Ohanian, 1990). The manipulate check questions on expectancy violation were also further expanded to four sets of questions: overly aggressive, not aggressive enough, overly polite and not polite enough. Questions were phrased such as “the __ (scientist or blog writer) writes in an overly aggressive/polite writing style than I expected” or “the __ (scientist or blog writer) writes in a not aggressive/polite enough writing style than I expected”.

Stimuli

A part of a blog article (Cadaver, 2015, April) from the Internet (about 480 words) targeted at people who do not believe in GMO products was used as one of the stimuli in the study. The original article (with limited editing) was treated as the aggressive condition. This article was then modified to serve as the neutral condition by removing aggressive elements, such as attacks on specific targets (Infante & Wigley III, 1986). It was further modified into a polite version using approaches from politeness theory focused on respecting the opponent’s autonomy and working toward sharing the same group identity. For example, the title of the original article (aggressive condition) was “Anti-GMO Alarmists are Misinformed Idiots.” The modified non-aggressive title was “Anti-GMO Skeptics are Misinformed,” whereas the polite version was “GMO Worriers have been Mislead.” The profile photo was displayed on the left side of the article along with author information. The same profile photo was used for both expert and non-expert conditions. The expert was described as “Dr. Alex Johnson, food scientist at a world renowned university, studying GMOs for over 10 years, father of three,” and the non-expert was described as “Mr. Alex Johnson, father of three.” Messages were also pretested with LIWC. Differences on several LIWC dimensions such as swear, anger, power, certain, positive

emotion can be observed from the three style conditions. Aggressive condition was observed with more portion of swear, anger, power and certain elements than other conditions. Polite condition was observed with more positive emotion than other conditions.

Procedure

Four pre-screening questions were asked before the start of this study, including questions regarding participants' age, gender, types of news they follow, and major grocery shopper in the household. Participants under 18 who did not select science and health as the types of news they follow or were not one of the major household grocery shoppers were screened out and compensated with $0.05. Participants who passed the pre-screening questions were asked to read an informed consent form and were then directed to a page informing them that they were being asked to help to assess a scientist's or a grocery shopper's writing by evaluating an article related to GMO issues.

Participants were first introduced to the definition of genetically modified organisms (GMOs), and were then asked about their attitudes toward GMOs. They were informed that they were to read a blog article; the author of the article was introduced and participants were asked to rate the level of expertise and trustworthiness they perceived this author to possess. Next, participants were randomly assigned to one of the six article conditions. After reading, they were asked a series of questions that included assessments of participants' perceived aggressiveness, perceived politeness, writer likability, expectancy violation, perceived quality of the message, perceived writer likability, etc. Participants were debriefed in the end and compensated with extra $0.7 as incentive. On average, each participant spent 13 minutes (SD = 9.33) to finish the survey.

Data Analysis

Study two also used structural equation modeling with Mplus to analyze the data. Attitude toward GMOs was measured prior to the stimuli and was controlled in the structural equation model. Source was included as a moderator on the path between communication style and expectancy violation, as well as the path between communication style and the two dependent variables.

STUDY TWO RESULTS

Manipulation Check

Two manipulation check tests were conducted to ensure respondents perceived the types of message styles differently, and that they perceived the expertise of source differently in each condition. An ANOVA test showed that respondents perceived the aggressive message more aggressive than others (M = 5.95, SD = 1.28), followed by the neutral message (M = 4.33, SD = 1.50), and the polite message (M = 3.38, SD = 1.43), $F(2,413) = 119.19$, $p < .01$, $\eta^2 = .37$). Meanwhile, the polite message was perceived as most polite (M = 5.34, SD = 1.21), followed by the neutral message (M = 4.23, SD = 1.47), and the aggressive message (M = 2.07, SD = 1.37), $F(2,413) = 213.64$, $p < .01$, $\eta^2 = .51$) . Post-hoc analyses showed that the difference between each condition is significant as well. Moreover, the results showed that respondents reported a perceived higher level of expertise from the scientist writer (M = 5.93, SD = .99) as opposed to the non-scientist writer (M = 3.72, SD = 1.24), $F(1, 413) = 404.13$, $p < .01$, $\eta^2 = .50$). This confirmed the success of the manipulation. An additional finding from the pre-test was that the level of perceived trustworthiness differs between scientist and non-scientist conditions $F(1, 413) = 21.89$, $p < .01$, $\eta^2 = .05$). The scientist writer was perceived to be slightly more trustworthy (M = 5.19, SD = 1.22) than the non-scientist writer (M = 4.65, SD = 1.12). The results of the means of all variables in all six conditions (3 communication styles x 2 expertise levels) are reported in Table 4.

Measurement Model Fit

To test the measurement model fit of study two, we conducted a confirmatory factorial analysis by constraining the factor loadings, residuals, covariances and regressions to be equal across different groups. The fit indexes of the measurement model for the overall model served

as the baseline model. They suggest that the model fit the data adequately (χ^2 (177) = 1410.62, p < .00; CFI = .98, TLI = .97, RMSEA = .13). The loading of the items is reported in Table 5.

Table 4. Means and standard deviation for each variable by condition in study two.

	Overall M(SD)	**Aggressive M(SD)**		**Neutral M(SD)**		**Polite M (SD)**		**F (eta squared) Style**	**F (eta squared) Source**
		Non	Expert	Non	Expert	Non	Expert		
In general, what is your attitude toward GMOs?									
Negative / Positive									
Bad / Good									
Unfavorable / Favorable									
Attitude toward GMOs (α=.99)	3.56	3.53	3.40	3.29	4.01	3.58	3.39	.34	.12
	(1.96)	(1.87)	(1.89)	(1.81)	(2.05)	(2.17)	(1.88)	(.00)	(.00)
In your opinion, the author of this article is probably…									
An expert									
Experienced									
Knowledgeable									
Qualified									
Skilled									
Perceived Expertise (α=.97)	4.84	3.78	6.01	3.59	5.96	3.76	5.82	.78	**404.13****
	(1.57)	(1.18)	(.85)	(1.34)	(1.06)	(1.21)	(1.05)	(.00)	(.50)
Dependable									
Honest									
Reliable									
Sincere									
Trustworthy									
Perceived Trustworthiness (α=.95)	4.93	4.79	5.26	4.45	5.35	4.70	4.98	1.11	**21.89****
	(1.20)	(1.13)	(1.15)	(1.09)	(1.22)	(1.13)	(1.27)	(.01)	(.05)
Considering both content and style, how aggressive would you say this article was (Not at all aggressive/Very aggressive)									
And would you say the article was … (Extremely non-aggressive/Extremely aggressive)									

Table 4 (cont'd)

	4.47	5.98	5.94	4.44	4.22	3.36	3.41	**119.19****	.03
Perceived Aggressiveness (α=.96)	(1.76)	(1.10)	(1.44)	(1.510	(1.49)	(1.37)	(1.50)	(.37)	(.00)
Considering both content and style, how polite would you say this article was (Not at all polite/Very polite)									
And would you say the article was … (Extremely impolite/Extremely polite)									
Perceived Politeness (α=.96)	3.99	1.96	2.18	3.98	4.44	5.45	5.21	**213.64****	.01
	(1.91)	(1.13)	(1.55)	(1.51)	(1.42)	(1.12)	(1.31)	(.51)	(.00)
And with regard to the ____ who wrote the article:									
The __'s writing was appropriate for a __. (R)									
The __ wrote in the way that I would expect most __ to write. (R)									
The __ used a normal writing style for a __. (R)									
The __'s writing was unusual for a __.									
Expectation Violation (α=.93)	3.71	3.89	5.81	2.54	3.94	2.36	3.93	**50.12****	**112.65****
	(1.81)	(1.68)	(1.59)	(1.16)	(1.54)	(1.06)	(1.40)	(.20)	(.21)
The __ used a too aggressive writing style for a __.									
The __'s writing was overly aggressive for a __.									
The __ was too aggressive as a __.									
The __ wrote in a really aggressive way that I would not expect most __ to do.									
Aggressive over Violation (α=.99)	3.53	4.95	5.75	3.05	3.62	2.04	2.40	**119.63****	**10.21****
	(2.17)	(1.84)	(1.72)	(1.87)	(1.92)	(1.34)	(1.61)	(.37)	(.02)
The __ used a not aggressive enough writing style for a __.									
The __'s writing was not aggressive enough for a __.									
The __ was not aggressive enough as a __.									

Table 4 (cont'd)

The __ wrote in a not aggressive enough way that I would not expect most __ to do.									
Aggressive under Violation (α=.95)	2.27 (2.17)	1.54 (.82)	1.58 (1.06)	2.26 (1.11)	2.44 (1.46)	2.67 (1.40)	2.84 (1.36)	**33.15**** (.14)	.45 (.00)
The __ used a too polite writing style for a __.									
The __'s writing was overly polite for a __.									
The __ was too polite as a __.									
The __ wrote in a really polite way that I would not expect most __ to do.									
Polite over Violation (α=.95)	2.20 (1.33)	1.40 (.85)	1.53 (1.09)	2.16 (1.06)	2.42 (1.41)	2.57 (1.24)	2.86 (1.52)	**36.35**** (.15)	2.09 (.01)
The __ used a not polite enough writing style for a __.									
The __'s writing was not polite enough for a __.									
The __ was not polite enough as a __.									
The __ wrote in a not polite enough way that I would not expect most __ to do.									
Polite under Violation (α=.98)	3.44 (2.09)	4.76 (2.06)	5.59 (1.87)	2.81 (1.54)	3.47 (1.85)	2.07 (1.20)	2.49 (1.50)	**108.54**** (.35)	**12.67**** (.03)
To what extent do you feel the article is?									
Unbelievable / Believable									
Unconvincing / Convincing									
Not compelling / Compelling									
Illogical / Logical									
Implausible / Plausible									
Unreasonable / Reasonable									
Not sound / Sound									
Message Quality (α=.97)	4.69 (1.69)	4.12 (1.60)	3.64 (1.81)	4.78 (1.57)	5.02 (1.54)	5.27 (1.54)	5.05 (1.49)	**25.46**** (.11)	1.52 (.00)

Table 4 (cont'd)

Now that you have read the article, do you think the author of the article would be ..									
Not at all friendly / Very friendly									
Not at all likable / Very likable									
Not at all warm / Very warm									
Not at all approachable / Very approachable									
Not at all similar to me / Very similar to me									
Not at all worth asking for advice / Very worth asking for advice									
Not at all knowledgeable / Very knowledgeable									
Writer Likability (α=.94)	4.28 (1.58)	3.04 (1.52)	3.01 (1.53)	4.34 (1.43)	4.74 (1.32)	5.09 (1.08)	5.04 (1.05)	**90.40**** (.31)	.04 (.00)

Notes: n = ~416. Questions were asked using seven point scales. __ is filled up with either "scientist" or "blog writer." (R): reserved.

Table 5. Unstandardized factor loading of measurement items in model test of study two.

	Estimate	S.E	P value
Pre-attitude			
F1: Negative / Positive	1.00	.00	999.00
F2: Bad / Good	.98	.02	.00
F3: Unfavorable / Favorable	.99	.02	.00
Expectation Violation			
F1: The scientist's writing was appropriate for a scientist. (R)	1.00	.00	999.00
F2: The scientist wrote in the way that I would expect most scientists to write. (R)	.76	.04	.00
F3: The scientist used a normal writing style for a scientist. (R)	.77	.03	.00
F4: The scientist's writing was unusual for a scientist.	.62	.04	.00
Message Quality			
F1: Unbelievable / Believable	1.00	.00	999.00
F2: Unconvincing / Convincing	.98	.01	.00
F3: Not compelling / Compelling	.96	.01	.00
F4: Illogical / Logical	1.00	.01	.00
F5: Implausible / Plausible	.99	.01	.00
F6: Unreasonable / Reasonable	1.01	.01	.00
F7: Not sound / Sound	.98	.01	.00
Writer Likability			
F1: Not at all friendly / Very friendly	1.00	.00	999.00
F2: Not at all likable / Very likable	1.05	.01	.00
F3: Not at all warm / Very warm	1.05	.01	.00
F4: Not at all approachable / Very approachable	1.01	.01	.00
F5: Not at all similar to me / Very similar to me	.78	.03	.00
F6: Not at all worth asking for advice / Very worth asking for advice	.95	.01	.00
F7: Not at all knowledgeable / Very knowledgeable	.95	.01	.00

Notes: n = ~416. (R): reserved.

Hypotheses Test

We used ANOVA and structural equation modeling to answer the rest of the hypotheses. First, the fit indexes of the full model shows that the model fitted the data adequately ((χ^2 (170) = 958.94, $p < .01$; CFI = .98, TLI = .97, RMSEA = .10).

In this study, we tested the hypotheses and research questions (RQ1, H1, H2a-b) from study one as well as the newly proposed hypotheses H5a-b and H6. In study two, RQ1 and H1 asked and proposed the direct effect of communication style on message quality and writer likability in the context of the GMO debate. Similar to the findings in study one, the result of the

ANOVA test showed a significant difference between aggressive message style and the neutral and polite styles ($F(2,412) = 25.46$, $p < .01$), without controlling the effect of expectancy violation. The aggressive message was perceived with less quality ($M = 3.87$, $SD = 1.72$) than the neutral message ($M = 4.91$, $SD = 1.55$) or the polite message ($M = 5.17$, $SD = 1.52$). Post-hoc analysis showed that no significant difference between the neutral message style and the polite message style was observed in terms of perceived message quality. Meanwhile, respondents also rated perceived writer likability differently in the three conditions ($F(2, 410) = 90.40$, $p < .01$). Those who read the aggressive message found the writer least likable ($M = 3.02$, $SD = 1.52$), followed by the neutral message ($M = 4.56$, $SD = 1.52$), and the polite message ($M = 5.07$, $SD = 1.06$). Post-hoc analysis showed that there is significant difference between each two groups. As such, H1 is supported.

Just as it did in study one, H2a-b proposed the mediation effect of expectancy violation between message style and (a) message quality and (b) writer likability. First, when source and pre-existing attitudes toward GMOs were controlled in study two, the results of the SEM test showed that message style has a positive effect on expectancy violation when controlling for the indirect effect and residual covariance between message quality and writer likability ($\beta = .40$, $p < .05$). The aggressive message was mostly likely to violate individuals' expectations, while the polite message was least likely to do so. Second, expectancy violation has a significantly negative effect on both message quality ($\beta = -.65$, $p < .01$) and writer likability ($\beta = -.67$, $p < .01$), which suggests that, the more participants' expectations are violated, the lower they perceive message quality and writer likability. Furthermore, message style had no statistically significant effect on message quality ($\beta = -.09$, *n.s*) and had a significantly negative effect on writer likability ($\beta = -.62$, $p < .01$). Therefore, the results of the mediation analysis showed that

expectancy violation partially mediates the relationship between message style and writer likability, and fully mediates the relationship between message style and message quality. This finding, in the context of the GMO debate, confirms the same finding from study one in the context of the child vaccination debate. In other words, expectancy violation explains how aggressive messages lead to more negative outcomes, while polite messages lead to more positive outcomes. Thus, just as in study one, H2a-b is supported in study two.

The next section reports the moderation effect of source expertise (H5a-b, H6). First, the results showed that the source has positive direct effect on expectancy violation ($\beta = .87$, $p < .01$), message quality ($\beta = .54$, $p < .01$) and writer likability ($\beta = .50$, $p < .05$). This means that, when communication style and pre-existing attitudes toward GMOs are controlled, individuals perceive scientists' message as higher quality and find the writer more likable in comparison to a message from a non-scientist. Individuals also found that their expectations are more likely to be violated when they read a message from a scientist, regardless of communication style. However, no interaction effect between communication style and source difference were found on any dependent variables.

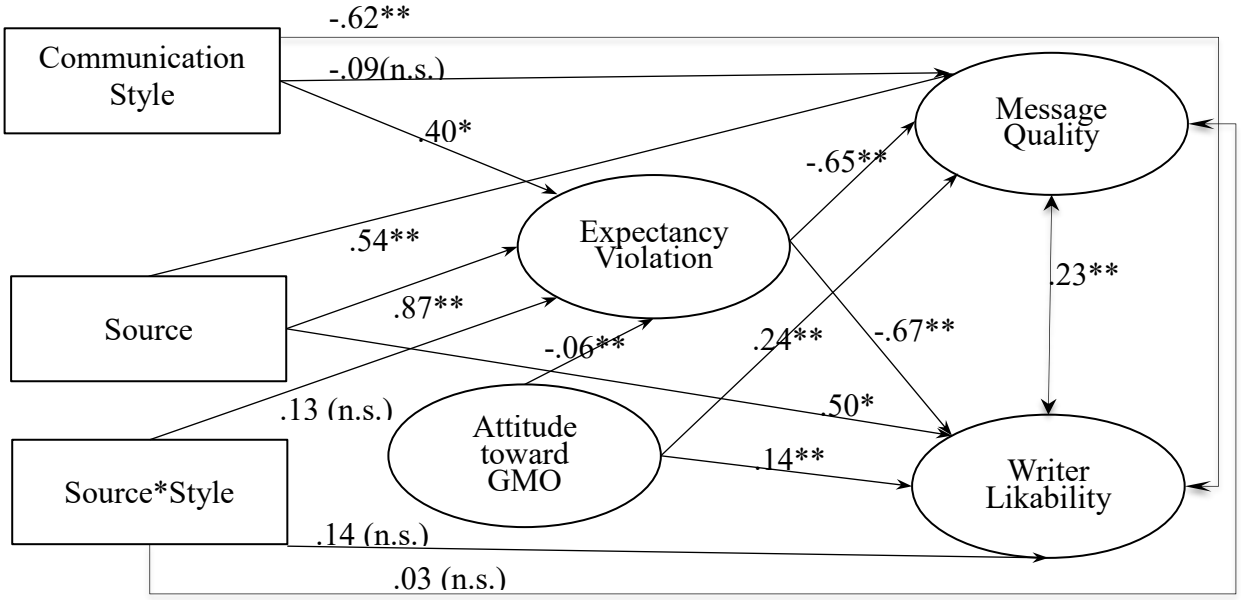
Study two also confirmed the effect of pre-existing attitudes toward the issue on individuals' perceptions of different communication styles. Just as in study one, the results of study two showed an overall positive effect of pre-existing attitudes on message quality and writer likability, and a negative effect on expectancy violation. The detailed results are reported in Table 6. The simplified path diagram of study one's model is also presented below (Figure 4).

Table 6. Regression and covariance table of study two.

	Regression coefficients		
	USTD loading	STD loading	Partial r^2
Message style >> Expectancy violation	.40*	.27	0.07
Pre-attitude >> Expectancy violation	-.06**	-.10	0.01
Source >> Expectancy violation	.87**	.35	0.12
Style*Source >> Expectancy violation	.13	.18	0.03
Pre-attitude >> Message quality	.24**	.42	0.18
Message style >> Message quality	-.09	-.07	0.00
Source >> Message quality	.54**	.24	0.06
Expectancy violation >> Message quality	-.65**	-.72	0.52
Style*Source >> Message quality	.03	.05	0.00
Pre-attitude >> Writer likability	.14**	.23	0.05
Message style >> Writer likability	-.62**	-.43	0.18
Source >> Writer likability	.50*	.21	0.04
Expectancy violation >> Writer likability	-.67**	-.69	0.48
Style*Source >> Writer likability	.14	.19	0.04
Writer likability with Message quality	.23**	.51	0.26

Note: n= ~416, **: $p < .01$, : $p < .05$. r^2(quality) = .66, r^2(likability) = .68, r^2(violation) = .39.

Figure 4. Simplified path diagram of study two.



Note: n= ~416, Communication style was coded as: polite=-1, neutral=0, aggressive=1, Source was coded as: lay person=1, scientist=2; **: $p < .01$, *: $p < .05$, *n.s.*: not significant.

STUDY TWO DISCUSSION

It's important to note that study two replicated the model in study one in a different risk context—the GMO debate. In addition to study one, study two mainly examined the effect of source difference in individuals' perceptions of communication style. The findings of study two confirmed the theoretical model built in study one, which points to the important role expectancy violation plays in how individuals process different communication styles, in varying contexts.

Additionally, the results of attitudes toward GMOs as a covariate also confirmed the effect of pre-existing attitudes toward the issue on individuals' perceptions of different communication styles. It is also interesting to note that, different from the far above midpoint score on attitude toward child vaccination, individuals' attitudes toward GMOs were not so promising, as the average score was around the midpoint. This suggests that individuals' concerns regarding GMOs are still higher than those surrounding child vaccination in the U.S.

Moreover, the added factor of communication source was found to be another important factor influencing the effects of strategic risk communication. A message from a scientist appears to be more effective than messages from a non-scientist in terms of perceived message quality, and a scientist appears to be a more likable writer that a non-scientist. The possible reason for this finding is the positive effect of scientists' perceived expertise and trustworthiness, as compared to that of a non-scientist. Although no significant moderation effect of source expertise was observed, it still provides us some implication to understand effect of source and communication style at the same time. It suggests that the effects of communication style on both message quality and writer likability appear to be similar with either a scientist or non-scientist communicator. One practical implication of study two is that scientists should be encouraged to get more involved in risk communication with the public, and because the public has higher level

of expectation on scientists to talk nicely, scientists should be careful with using strong intense message style when communicating risk topics like GMO.

OVERAL DISCUSSION

This two-part study extends the research on aggressive communication into a more comprehensive understanding of two dimensions of communication style. Better understanding how communication style works in risk communication contexts, as well as how the influences of factors like attitude toward the issue and communication sources influence these contexts. More importantly, the two-part study highlights the value of understanding audiences' expectations toward communicators and the consequences of expectancy violation during these interactions. The consistent findings from the two-part study showed that how individuals react to aggressive, neutral and polite communication styles differently is determined by the level of violation individuals proceed during the interaction. More specifically, the two studies yield a series of findings on the effect of aggressive and polite communication styles. In general, it seems clear that a polite style of message is more effective, and aggression, such as attacking the opposition, does not enhance message content or result in a perceived positive image for a communicator. Moreover, both studies showed that the difference on writer likability was observed between each two communication styles, but the difference on message quality was not significant between neutral and polite styles, which suggests that using polite style may not make the message more compelling but still can have more positive effect on the communicator's image.

Besides exploring the effect of communication style from the perspective of strategic communication, the findings also can be connected to the literature on information processing to help further explore the factors

The practical implication of this research is that science and health communicators should be wary of using too much agression in their educative communications, especially in cases

where they might be expected to negativley violate audiences' expectations. However, the tactic of using polite language did not appear to have a strong effect on perceived message quality when compared to that of neutral language. Thus, communicators should also consider their personal characteristics (such as their perceived expertise, or public image) and the audience's characteristics (such as their attitude toward the issue, or involvement with the issue) when considering which communication tactics will be the most persuasive.

LIMITATION AND FUTURE STUDY

There are a couple limitations to the current two-part study. First, due to the context of the two studies, it is difficult to be polite enough to achieve positive violation in risk communication. Future research can test the concept of strategic communication style in other contexts. Second, the current study did not include measurement on behavior or behavior intention in the model, which could be important outcomes to be considered in future studies. Third, the current study controlled participants' involvement by the prescreen questions on individual's previous behaviors. According to ELM, individuals' involvement may affect whether they would use peripheral or central route to process information, future study can include involvement in the model to better understand the role of communication style in the process. Fourth, the data was collected from U.S. users of mTurk. mTurk participants may not represent the whole U.S. population, prior research shows that mTurk participants in the U.S. fall into the age range we expect for parents, and that the gender distribution is close to even. The population on mTurk is not fully representative, and it should be expected that the child vaccination situation might be different in other countries, with the consideration of other factors, such as vaccine policy, and the types of information on vaccination parents in other countries receive. The degree to which communication style may affect expectancy violation might also vary by country. Audiences in other countries may have different types of expectation for the common accepted communication styles. Future study should consider culture as a factor in processing messages with different communication styles. Second, the current study only examined this conceptual model in the context of child vaccination and the GMO debate. Future research might examine the conceptual model in other types of strategic beyond risk communication contexts. Moreover, in addition to online written blog articles, future studies

might also examine communication style in other formats, such as video or audio. Future research can also consider measuring audiences' behavioral intentions, emotions, and actual behaviors when testing this model.

APPENDICES

Appendix A. Message stimuli of study one.

Table 7. Message stimuli of study one.

To dumb [A] parents who do not vaccinate their children	**To parents who do not vaccinate their children**	**To concerned [N] parents who do not vaccinate their children**
It's amazing [F] how a combination of poor information and anecdotal evidence can prey on the weak minded among us.[A] Today's hate is about the rise of STUPID parents who, because of their inability to form rational thought[A], are now depriving their children of vaccines. First and foremost, vaccines do not cause Autism or Asperger's. This is the primary fear among vaccine-deniers[A]. Secondly, Autism and Asperger's are not diseases-they are facts of life. If someone has Autism or Asperger's, it's part of who they are; it has nothing to do with a damn flu shot[F]. Let's get that straight before we go any further, shall we?[F] If nothing else, then know this: a person does not become "infected" with Autism. They are who they are, because that's who they are. And you can either accept them or get lost. [F]	It's amazing how a combination of poor information and anecdotal evidence can influence people. Today's column is about the rise of parents who, because of their unskeptical acceptance of information, are now not providing vaccines for their children. First and foremost, vaccines do not cause Autism or Asperger's. This is the primary fear among vaccine-skeptics. Secondly, Autism and Asperger's are not diseases-they are facts of life. If someone has Autism or Asperger's, it's part of who they are; it has nothing to do with a flu shot. Let's get that straight before we go any further. If nothing else, then know this: a person does not become "infected" with Autism. They are who they are, because that's who they are. You have to accept that.	It's concerning[N] how a combination of poor information and anecdotal evidence can influence even our closest friends[P]. Today's column is about the rise of parents who, because of a trusting acceptance of information, are now not providing vaccines for their children. First and foremost, vaccines do not cause Autism or Asperger's. This is the primary fear among some of our friends[P]. Secondly, Autism and Asperger's are not diseases-they are facts of life. If someone has Autism or Asperger's, it's part of who they are; it has nothing to do with a flu shot. I hope we can agree on that[N] before we go any further. If nothing else, then I hope my fellow committee members can consider[N] this: a person does not become "infected" with Autism. They are who they are, because that's who they are. It is understandable to be frustrated[N], but we should to[N] accept that.

Table 7 (cont'd)

When it comes to vaccines, most people have no idea[F] how they work. They don't understand the concept of herd immunity, and they don't understand how an immune system works. Therefore, people who refuse their children vaccines don't understand why the good parents (who love their children enough to get them vaccinated) do not want those little walking biohazards [A] in their schools or in public playgrounds. And they are actually offended when the government forbids children who haven't been vaccinated from entering public schools. They ask, "Why?" The reason is simple: vaccines increase immunity but do not make one immune. If some poor fool hasn't been vaccinated against an illness, and they get that illness, they can then (and will) spread that illness around, even to people who are vaccinated. It's called "herd immunity." If enough people are immune, then no one gets the illness, and the illness doesn't spread. And once members of the "herd" stop using the vaccine, the illness can slip back in and start spreading again.	When it comes to vaccines, most people have no idea how they work. They don't understand the concept of herd immunity, and they don't understand how an immune system works. Therefore, people who elect not to vaccinate their children don't understand why other parents (who decide to get their children vaccinated) do not want unvaccinated children in their schools or public playgrounds. And they are actually confused when the government forbids children who haven't been vaccinated from entering public schools. They ask, "Why?" The reason is simple: vaccines increase immunity but do not make one immune. If someone hasn't been vaccinated against an illness, and they get that illness, they can then (and will) spread that illness around, even to people who are vaccinated. That's why it's called "herd immunity." If enough people are immune, then no one gets the illness, and the illness doesn't spread. And once members of the "herd" stop using the vaccine, the illness can slip back in and start spreading again.	When it comes to vaccines, most people have do not know how they work. They have not had a chance to learn about[N] the concept of herd immunity, or how an immune system works. Therefore, people who choose not to vaccinate their children may be unclear[N] about why other parents (who decide to get their children vaccinated) are concerned about[N] unvaccinated children in their schools or public playgrounds. And they are understandably[N] upset when the government forbids children who haven't been vaccinated from entering public schools. They ask, "Why?" The reason is simple: vaccines increase immunity but do not make one immune. If someone hasn't been vaccinated against an illness, and they get that illness, they can then (and will) spread that illness around, even to people who are vaccinated. That's what we[P] call "herd immunity." If enough people are immune, then no one gets the illness, and the illness doesn't spread. And once members of the "herd" stop using the vaccine, the illness can slip back in and start spreading again.

Table 7 (cont'd)

Unfortunately, thanks to really, really, really, really, unintelligent morons[A], diseases that have been gone for hundreds of years are returning with a vengeance, and stronger than ever. As more people continue to think that vaccines cause Autism or other illnesses, the harmful crap[A] they're supposed to be protecting us from is coming back. Thanks, jerks! [A] Because of the ignorant and uninformed[F], whooping cough is a "thing" again. My parents used to tell me stories about it when I was a kid, and about the stuff we're so lucky that we'll never have to go through. Well, I guess they got the last part wrong. Because they're coming back, baby! [F] Score one for human stupidity! [A] So, yes, when you decide not to get your vaccines-or deprive your child of them-you are posing a health risk to everyone [F] you come in contact with. We, expect better[F].	Unfortunately, due to parents who are making a decision that they may not realize is not supported by science, diseases that have been gone for hundreds of years are returning with a vengeance, and stronger than ever. As more people continue to think that vaccines cause Autism or other illnesses, the harmful afflictions they're supposed to be protecting us from are coming back. Because of the lack of communication on important health information, whooping cough is a "thing" again. My parents used to tell me stories about it when I was a kid, and about the stuff we're so lucky that we'll never have to go through. Well, I guess they got the last part wrong. Because they're coming back sadly! So, yes, when you decide not to get your vaccines, you are posing a health risk to everyone you come in contact with. We can do better.	Unfortunately, although I respect that it is each parent's decision, they may not realize their choice is not supported [N] by science, diseases that have been gone for hundreds of years are returning with a vengeance, and stronger than ever. As more people continue to think that vaccines cause Autism or other illnesses, the harmful afflictions they're supposed to be protecting us from are coming back. Because of the lack of shared dialogue[N] on important health information, whooping cough is a challenge again. My parents used to tell me stories about it when I was a kid, and about the stuff we're so lucky that we'll never have to go through. I am worried they may have been wrong because, sadly, some diseases are coming back. [N] So, yes, when you decide not to get your vaccines, you may be[N] posing a health risk to those[N] you come in contact with. Together [P], we can do better.

Note: Semantic codes: Aggressive message: Forceful language (F), Attack on Person (A); Polite message: Negative Face (N), Positive Face (P).

Appendix B. Message stimuli of study two.

Table 8. Message stimuli of study two.

GMO Alarmists Are Misinformed Idiots	**GMO Skeptics Are Misinformed**	**GMO Worriers Have been Mislead**
The use of genetically modified organisms, or GMOs, is a contentious issue in America but we need to move beyond this idiocy. On one hand we have the pro-GMO people, who enjoy a broad scientific consensus on their side. Then we have the anti-GMO side, which is filled with dirtbag, alarmist weasels [A] who are actively working [F] to keep back scientific advancement. The promise of GMOs is amazing despite what some idiots say [A]. They're engineered to be resistant to pests, to have a higher nutritional value, and to be able to grow in places that would normally be inhospitable to certain crops. Food insecurity is an enormous, worldwide problem, and crops that are heartier and have higher yields. Their ability to grow in more places is important to providing food access to developing countries, which the anti-GMO morons [A] would realize if they read something other than absurd web-trash. [A]	The use of genetically modified organisms, or GMOs, is a contentious issue in America but we need to move on. On one hand we have the pro-GMO people, who enjoy a broad scientific consensus on their side. Then we have the anti-GMO side, which is filled with skeptical, concerned people who are actively working to keep back what they see as flawed science. The promise of GMOs is amazing. They're engineered to be resistant to pests, to have a higher nutritional value, and to be able to grow in places that would normally be inhospitable to certain crops. Food insecurity is an enormous, worldwide problem, and crops that are heartier and have higher yields. Their ability to grow in more places is important to providing food access to developing countries, which the anti-GMO crowd would not realize because they often read poor quality websites.	The use of genetically modified organisms, or GMOs, is a contentious issue in America but we need to move forward together[P]. On one hand we have the pro-GMO people, who enjoy a broad scientific consensus on their side. Then we have the GMO worriers, who are just like many people I know [P] but more concerned[N] and are understandably pushing against[N] what they see as flawed science. The promise of GMOs is amazing despite of some understandable concerns [N] . They're engineered to be resistant to pests, to have a higher nutritional value, and to be able to grow in places that would normally be inhospitable to certain crops. Food insecurity is an enormous, worldwide problem, and crops that are heartier and have higher yields. Their ability to grow in more places is important to providing food access to developing countries. It is understandable[N] that some of us, including people close to me [P] would not realize because they may have [N] often read some poor quality websites.

Table 8 (cont'd)

What's particularly infuriating [F] about the backlash toward GMOs is that it's largely coming from people who are typically very pro-science, but for some reason when it comes to food they lose all ability to reason and turn into mouth-foaming crusaders. [A] Well, I'm here today to discuss some typical and largely unfounded anti-GMO arguments you'll hear these morons barking[A] at anyone who'll listen. Let's begin. The common perception among alarmist idiots[A] is that GMOs are bad for you, and eating them has all kinds of health risks. The fact is however, that institutions such as the World Health Organization, the American Medical Association, the National Academy of Science, and countless other organizations have all deemed GMOs perfectly safe. The only people who aren't convinced are those who keep their heads buried in the sand. [A]	What's particularly challenging about the backlash toward GMOs is that it's largely coming from people who are typically very pro-science in most other situations, but for some reason when it comes to food they are both resistant to the arguments and vocal about their concerns. Well, I'm here today to discuss some typical and largely unfounded anti-GMO arguments you'll hear these skeptics sharing with interested audiences. Let's begin. The common perception among concerned skeptics is that GMOs are bad for you, and eating them has all kinds of health risks. The fact is however, that institutions such as the World Health Organization, the American Medical Association, the National Academy of Science, and countless other organizations have all deemed GMOs safe. The only people who aren't convinced are those who have failed to keep up with the science.	What's particularly challenging about the backlash toward GMOs is that it's largely coming from people who are typically very pro-science in most other situations, but for honest reasons when it comes to food they are both understandably reluctant to accept hard to understand evidence and open about their concerns[N]. I'm here today to discuss some typical and largely unfounded anti-GMO arguments you'll hear these concerned members of our community[P] sharing with interested audiences. Let's begin. The common perception among some of our fellow community members[P] is that GMOs are bad for you, and eating them has all kinds of health risks. However, many may not know[N] that institutions such as the World Health Organization, the American Medical Association, the National Academy of Science, and countless other organizations have all deemed GMOs safe. Often[N], the people who aren't convinced are those who have not had the opportunity to keep up with the science.[N]

Table 8 (cont'd)

In fact, the overwhelming majority of the scientific community is staunchly[F] in favor of GMOs, which for some reason doesn't seem to deter the vapid idiots who cry out against them. [A] It's like duct taping your eyes shut and refusing to believe that the earth is round. [F] If you're looking for a modern equivalent, think of Jenny McCarthy and her anti-vaccination dimwits. These are people who believe based on some weird, misguided hunch [A] that science is just some kind of scam to cram them full of cancerous oranges.[F] Indeed, it turns out that one of the main groups that promote anti-GMO idiocy [A] (the American Academy of Environmental Medicine) also spreads dangerous anti-vaccine paranoia. [A] The group has given itself a fancy sounding name despite not being recognized by any legitimate medical school as way to trick dummies into believing its fantasies. [A] At the end of the day, we all need to ask ourselves if we think that the anti-GMO cranks are smarter than scientific community.	In fact, the overwhelming majority of the scientific community is in favor of GMOs, which for some reason doesn't seem to deter the concerned skeptics who argue against them. It's like they are simply refusing to accept the evidence. If you're looking for a modern equivalent, think of Jenny McCarthy and her vaccination doubters. These are people who believe based on an unfounded hunch that science is just some kind of scam to injure their health. Indeed, it turns out that one of the main groups that promote anti-GMO skepticism (the American Academy of Environmental Medicine) also spreads dangerous anti-vaccine information. The group has given itself an official-sounding name despite not being recognized by any legitimate medical school as way to trick others into believing its fantasies. At the end of the day, we all need to ask ourselves if we think that the anti-GMO groups are smarter than scientific community.	In fact, the overwhelming majority of the scientific community is in favor of GMOs, but this consensus unfortunately doesn't seem to reach the concerned members of our community[P] who argue against them. Therefore it's understandable that they do not accept the evidence of GMO safety. [N] If you're looking for a modern equivalent, think of Jenny McCarthy and her anti-vaccination skeptics. These are people who are hesitant to believe that the advance of science will improve their health. [N] Unfortunately, one of the main groups that promote GMO misinformation[N] (the American Academy of Environmental Medicine) also spreads some [N] anti-vaccine information. The group has given an official-sounding name despite not being recognized by medical schools as way to get well-meaning people to believe its errors. At the end of the day, we all need to ask ourselves if we think that our GMO skeptical neighbors [P] have better knowledge than scientific community.

Table 8 (cont'd)

My hope is that we can just listen to those with real expertise – not sham front-groups[A] for junk science– and move forward to solve some of the world's real problems.	My hope is that we can listen to those with real expertise – not unrecognized organizations with little science background – and move forward to solve some of the world's real problems.	My hope is that we can listen to those with real expertise – not unrecognized organizations with little science background – and move forward together[P] to solve some of the world's real problems.

Note: Semantic codes: Aggressive message: Forceful language (F), Attack on Person (A); Polite message: Negative Face (N), Positive Face (P).

Appendix C. Source stimuli of study two.

Figure 5. Source stimuli of study two.

High-expertise source

Low-expertise source

Appendix D. LIWC linguistic analysis result.

Table 9. LIWC linguistic analysis results.

	Vaccine (Study One)			GMO (Study Two)		
	Aggressive	Neutral	Polite	Aggressive	Neutral	Polite
Anger	1.94	.00	.00	1.84	1.03	.59
Negative emotion	4.95	2.00	2.07	4.81	3.31	2.77
Certain	1.29	1.06	1.03	2.40	1.90	1.38
Power	3.66	2.90	2.89	2.04	2.74	1.98
Affect	7.10	4.23	5.58	7.55	8.65	7.71
Sad	.65	.22	.21	.61	.42	.20

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