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An Exploration of the Influence that Source Credibility and Fear have on MMR Vaccination Intentions

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An Exploration of the Influence that Source Credibility and Fear have on MMR Vaccination Intentions

Carolyn Lagoe
University of Connecticut, 2013

The present investigation sought to explore the dual influence source credibility and fear have on childhood vaccination intentions among parents. A 2 x 2 experimental design was used to test the influence messages with manipulated levels of credibility (high/low) and fear (high/low) had on measles, mumps, and rubella (MMR) vaccination intentions among current (or future) parents of young children. Perceptions of source credibility and fear were both found to indirectly influence vaccination intentions. Specifically, the relationship between message exposure and behavioral intent was mediated by various social-cognitive constructs including attitudes, subjective norms, perceived behavioral control, susceptibility to disease, severity of disease and feelings of response efficacy. Implications, limitations and future directions are discussed.
An Exploration of the Influence that Source Credibility and Fear have on MMR Vaccination Intentions

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A Dissertation

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An Exploration of the Influence that Source Credibility and Fear have on MMR Vaccination Intentions

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# Table of Contents

Chapter 1: Introduction..............................................................................................................1

Chapter 2: Literature Review and Hypotheses..........................................................................4

Chapter 3: Pilot Study...............................................................................................................31

Chapter 4: Method..................................................................................................................37

Chapter 5: Results..................................................................................................................46

Chapter 6: Discussion..............................................................................................................57

References..................................................................................................................................70

Appendix A..................................................................................................................................83
List of Tables

Table 1. Factor Loadings………………………………………………………………………….48
Table 2. Factor Loadings…………………………………………………………………………49
Table 3. Final Path Coefficients………………………………………………………………52
List of Figures

Figure 1. Theory of Reasoned Action Model
Figure 2. Theory of Planned Behavior Model
Figure 3. 1983 Conceptualization of Protection Motivation Theory
Figure 4. Current Conceptualization of Protection Motivation Theory
Figure 5. Proposed Model
Figure 6. Final Model
Chapter 1

Introduction

Controversy over the safety of childhood vaccines began over twenty years ago when a medical journal, *The Lancet*, reported a link between the measles, mumps, rubella (MMR) vaccine and autism. In spite of a reaction on the part of this journal (Kirkby, 2010) and overwhelming medical evidence disproving the MMR-autism link, controversy about the safety of childhood vaccines has persisted (Carrey, 2009; Kennedy, LaVail, Nowak, Basket, & Landry, 2011; McCarthy, 2010; Kluger, 2009). While many parents no longer subscribe to the autism myth (Kennedy, LaVail, et al., 2011), the initial dispute served to spark additional concerns and medical mistrust among the public regarding the overall safety of childhood vaccines.

A recent investigation identified several misperceptions and/or myths that parents held about childhood vaccines. Specifically, parents reported concerns pertaining to vaccines’ potential to cause fevers (32%), learning disabilities (30%), and/or chronic disease (16%). A considerable proportion of those surveyed also believed that children receive too many vaccines within the first two years of life (34%), and that vaccines may not have been tested enough for safety (17%) (Kennedy, LaVail, et al., 2011). All told, only 23% of parents expressed no concerns about childhood vaccines.

In spite of health officials’ attempts to reassure the public that the MMR vaccine is safe, an increasing number of parents appear to be skipping out on childhood vaccinations altogether (O’Connor, 2011). In some areas of the nation, vaccination rates have reached levels as low as 40% (Washington State Department of Health, 2012), and increases in disease outbreaks have been reported. In 2011, health officials reported that the number of measles cases reached a fifteen-year high and that at least 89% of those cases occurred among individuals who were
either not vaccinated or whose vaccination status was unknown (Centers for Disease Control and Prevention, 2011). In cases such as these, parents’ fear, worry, and concerns associated with the risks of vaccination may have outweighed the perceived benefits one could reap by having their child vaccinated.

No single source of information is responsible for parents’ decisions to opt out of childhood vaccinations. Parents have reported using numerous sources including health professionals, interpersonal networks, traditional mass media, and the Internet as sources for information about these vaccines (Kennedy, Basket, & Sheedy, 2011). While health professionals have been identified as the most commonly used source of vaccination information among parents (Kennedy, Basket, & Sheedy, 2011), many parents have decided against adhering to the widely accepted vaccination recommendations in the medical community (Centers for Disease Control and Prevention, 2013a). Given this, additional sources of information may be influencing parents’ vaccination decisions.

In 2007, celebrities such as Jenny McCarthy and Jim Carrey began to publically question the safety of childhood vaccinations. Through the dissemination of incomplete, misleading, medically unsupported, and/or false information, Carrey and McCarthy have attempted to persuade parents to opt against available childhood vaccinations (Carrey, 2009; McCarthy, 2010; Kluger, 2009; Freed, Clark, Butchart, Singer, & Davis, 2011). Their anti-vaccine message has been widely disseminated via a number of media platforms including online blog posts, news magazine articles, and daytime television shows (Carrey, 2009; McCarthy, 2010; Kluger, 2009).

When informed of the debilitating illnesses that could result from widespread vaccination refusal, McCarthy stated, “I do believe sadly it's going to take some diseases coming back to realize that we need to change and develop vaccines that are safe. If the vaccine companies are
not listening to us, it's their f___ing fault that the diseases are coming back” (Kluger, 2009, para 5). McCarthy’s sentiments illustrate a viewpoint and strategy for change which government health organizations such as the Centers for Disease Control and Prevention remain opposed to (Kluger, 2009; Centers for Disease Control and Prevention, 2013a).

While celebrities may not be parents’ primary source of health information, it appears as though these individuals have the potential to influence health decision-making to some degree. Among a national sample, 76% of parents reported trusting their child’s physician “a lot” and 24% of participants reported trusting celebrities “some” for vaccination information (Freed, et al., 2011).

Given this, the present investigation seeks to address the relative influence multiple information sources, including celebrity sources, may have on vaccination decision-making among parents. Through the use of an experimental design, relevant communication, psychology, and health behavior variables will be used to examine the impact media messages have on childhood vaccination intentions among parents. In particular, this investigation will test health messages with manipulated levels of source credibility and fear to examine the influence these constructs (and others) have on vaccination decision-making among parents.
Chapter 2

Literature Review, Research Questions and Hypotheses

Health Message Exposure and Evaluation

Traditional mass media channels, including television, radio, newspapers, and billboards have become key sources of health information for American consumers. Whether health information is disseminated through campaign initiatives, newspaper articles, or televised news reports, Americans utilize these channels to acquire information pertaining to their personal health and/or the health of others (Dobransky & Hargittai, 2012; Oh, Kreps, Jun, Chong, & Ramsey, 2011).

Using a nationally representative sample, Oh and colleagues (2011) found that 96% of Korean Americans read print sources such as newspapers and magazines for health information and 79% viewed televised health segments. Among a group of college students, 30% of participants reportedly used traditional mass media sources (i.e., newspaper, magazine, television, radio and/or books) as a way to obtain health information pertaining to one’s lifestyle (Dobransky & Hargittai, 2012). Given that dependence on media messages for health information can influence risk perceptions and self-protective behaviors (Lin & Lagoe, 2013), messages disseminated from these channels may play a vital role in health decision-making among information consumers.

The actual content of a health message may not be the sole factor to influence individuals’ perceptions, cognitions, and subsequent behaviors when presented with health information. In particular, the credibility of an information source has the potential to influence whether an individual yields to a health message. As such, the influence of source credibility in this process will be explored.
Source credibility.

Source credibility has been identified as a variable that can influence the effectiveness of a health message. Specifically, the effectiveness of a message is partially dependent on an information consumers’ subjective perception of the credibility of that particular information source (Major & Coleman, 2012). Hovland, Janis, and Kelly (1953) define credibility as the believability of a source. This concept is commonly parceled out into the sub-dimensions of expertise (i.e., knowledge level) and trustworthiness (i.e., dependability) (Pornpitakpan, 2004). Additional endeavors have identified other dimensions of credibility such as dynamism (Hamilton & Stewart, 1993; Whitehead, 1968) and attractiveness (Ohanian, 1990).

Health information initiatives use diverse information sources to disseminate messages. Objectively, these sources can be categorized along a scale that ranges from high credibility to low credibility. Highly credible sources of information include doctors, nurses, and government health organizations. Sources of health information that would be scored lower along this continuum include non-government health organizations, lay individuals with no medical training, and celebrities.

Previous work in this domain demonstrates that in spite of information consumers’ ability to identify highly credible sources of information, some may still utilize low-credibility sources to a certain degree. Supporting these claims, Major and Coleman (2012) found that a sample of young, African-American men perceived a physician to be a more credible source of health information than a minister. Freed, Clark, Butchart, Singer, and Davis (2011) established that a majority of parents (76%) trusted their child’s doctor for vaccine safety information. However, this data also demonstrated that 24% of parents from the same sample trusted celebrities “some” for vaccination safety information. While it is apparent that consumers can easily identify health
care providers as highly credible sources of information, it seems as though these same individuals may still place some level of trust in sources that are not objectively considered to be highly credible sources of health information. Drawing upon this information, the first hypothesis is posed:

Hypothesis 1: A health message that is attributed to a celebrity source will be perceived as less credible than a health message that is attributed to a physician.

The level of trust placed in celebrity message sources is especially important because of celebrities’ tendency to serve as spokespeople for public health campaigns and initiatives. For instance, a colorectal screening initiative that was funded by the Centers for the Disease Control and Prevention (2013b) used a number of celebrity spokespeople (e.g., Meryl Streep, Diane Keaton, Morgan Freeman, & Katie Couric) to promote their messages of optimal health. Additionally, many celebrities have taken it upon themselves to become activists for certain health causes. For example, Bono became a “self-created” activist for HIV/AIDS awareness, funding, and research efforts (CBS News, 2009).

Assessing a health information consumers’ subjective rather than objective perception of source credibility is particularly important because of the influence that subjective perceptions of credibility can have on perceived message quality, usefulness, and/or cognitions and behaviors resulting from message exposure. For example, Major and Coleman (2012) found perceptions of source credibility to influence young, African-American males’ perceived effectiveness of an HIV-prevention message. Credibility has been found to influence certainty of attitudes among message receivers as well (Tormala & Petty, 2004).
The previous evidence signals the need to gain a more complete understanding of the influence perceptions of source credibility can have on message evaluations. In order to do this, the relationship between source credibility and perceptions of message evaluation must be tested.

**Message evaluation.**

In tandem with source credibility, receivers’ evaluations of health messages have the potential to influence perceptions, cognitions, and behaviors. Conceptually, message evaluation can be defined as whether a receiver found a particular message to be useful and/or helpful. Previous work within health domains have assessed message evaluation in response to message exposure (Volkman & Parrott, 2012; Cho & Cho, 2011). However, relatively less literature has examined the influence perceptions of source credibility can have on one’s overall evaluation of a health message. As a result of this gap in the literature, the first research question is posed:

RQ1: What is the relationship between message exposure, source credibility, and message evaluation?

Moving toward the outcomes of message evaluation, sparse work has explored the relationship between message evaluation and outcome variables in health contexts. Message outcome variables include perceptions and actions that may result from exposure to a message (Bodie, Burleson, & Jones, 2012). These outcomes can include perceptions, cognitions, and behaviors among receivers.

Tests of the relationship between message evaluation and relevant health outcome variables appear to be lacking. On a frequent basis, messages are considered to be high quality if they influence cognitions, perceptions, and/or behaviors in the intended direction. However, most investigations do not actually measure participants’ evaluations of message effectiveness and subsequently link them to target outcome variables. Of the scanty information available,
associations have been established between evaluations of a diet prevention messages, body dissatisfaction, and disordered eating behaviors among adolescent girls (Paxton et al., 2002).

To extend existing work, this study seeks to link message quality constructs to relevant health behavior variables. Testing the link between message evaluation and outcome constructs is of critical importance because assessing both message quality and message outcomes will allow for a more definitive link between the perceived effectiveness of a message and its’ subsequent influence on health-related attitudes, perceptions, and behaviors.

To link critical concepts and identify the mechanisms that mediate the relationship between message evaluation and behavioral intentions, the present investigation will be guided by two commonly utilized theories in the domains of health behavior, psychology, and communication. Specifically, this research will be guided by the theory of planned behavior and protection motivation theory.

The theory of planned behavior (TPB) and protection motivation theory (PMT) are two frameworks that have been used in numerous health behavior explorations (Armitage & Conner, 2001; Ajzen, 2011; Floyd et al., 2000). The frequent application of these theories are likely a consequence of their versatile and predictive nature across diverse health domains (Armitage & Conner, 2001; Floyd et al., 2000; Norman, Boer, & Seydel, 2005; Plotnikoff, Costigan, Karunamuni, & Lubans, 2013).

In a recent systematic review that examined the usage of eight social cognitive theories to explain physical activity in adolescents, Plotnikoff, Costigan, Karunamuni, and Lubans (2013) found the theory of planned behavior to be the most effective theory in explaining this phenomenon (i.e., relative to the other theories, planned behavior accounted for the largest percentage of variance explained). Additionally, protection motivation theory has demonstrated
the ability to explain a moderate amount of variance in investigations exploring issues such as exercise intentions (Tulloch et al., 2009) the use of stair gates among parents of toddlers (Beirens et al., 2008), and intentions to practice safe sun behaviors (Grunfeld, 2004).

**Theory of Planned Behavior**

Moving on to an in-depth explanation of the focal theories, the theory of planned behavior is a psychological framework that is based on many assumptions originally posed in the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980). The TRA assumes that attitudes and subjective norms exclusively lead to behavioral intentions and subsequent behavioral engagement (See Figure 1).

![Figure 1. Theory of Reasoned Action Model](image)

After the TRA was formulated, the theory was modified to account for behaviors that are not under an individuals’ complete volitional control (Ajzen, 1985; Ajzen, 1991; Armitage & Conner, 2001). From this modification, came the theory of planned behavior (TPB). According
to the assumptions of the TPB, attitudes, subjective norms, and perceived behavioral control independently contribute to behavioral intent which will lead to behavioral engagement. In this model, behavioral engagement is also directly influenced by perceived behavioral control. A visual representation of this model can be found in Figure 2.

Figure 2. Theory of Planned Behavior Model

**Attitudes.**

According to the TRA, attitudes are one of three factors that independently predict an individuals’ intent to engage in a specified behavior. Attitudes are defined as an individuals’ favorable or unfavorable evaluation of a particular behavior (Ajzen, 2002). They are formed as a function of that person’s behavioral beliefs, or beliefs about the likely consequences of a behavioral action. Health message exposure has already been linked to attitudes (Demyan &
Anderson, 2012). Through a mass-media campaign initiative, Demyan and Anderson (2012) found that participants who were exposed to a pro-social public service announcement about mental health issues had more favorable attitudes toward help seeking than those who had not viewed the video. While the exposure-attitude link has been established, current work has yet to explore whether message *evaluation* significantly predicts attitudes. As such, the next research question is posed:

Research Question 2: Will message evaluation predict attitudes toward vaccination behavior?

Moving back to the outcomes of the TPB model, attitudes have been identified as a consistent predictor of behavioral intent. Specifically, more favorable attitudes toward a behavior are hypothesized to predict stronger intentions to engage in that behavior. In contrast, more negative attitudes toward a behavior will result in stronger intentions to *refrain from* engaging in a specific action.

Supporting these claims, multiple meta-analytic investigations have found moderate-to-large average effect sizes between attitudes and intentions (Armitage & Conner, 2001; Kim & Hunter, 1993). The relationship between attitudes and behavioral intent has been substantiated in vaccination studies as well (Askelson et al., 2010; Gerend & Shepherd, 2012). For example, Akelson and others (2010) found that attitudes toward the HPV vaccine predicted vaccination intentions among mothers. Mothers who had more favorable attitudes toward the vaccine were more likely to plan to have their adolescent and/or teenage daughters (ages 9-15) vaccinated. Given this, the next hypothesis is posed:

Hypothesis 2: Attitudes toward vaccination will positively predict vaccination intent.

Subjective norms.
An additional antecedent variable in the TPB model is subjective norms. Subjective norms are based upon one’s normative beliefs, or beliefs about the normative expectations of other people (Ajzen, 2002). This concept is a type of social pressure that results from the product of two individual factors, normative perceptions and motivation to comply with salient others. Ajzen (1991) identified normative perceptions as “the likelihood that important referent individuals or groups will approve or disapprove of performing a given behavior” (p. 195). An individual’s motivation to comply refers to his or her feelings about whether or not he or she would like to comply with the salient referents of focus. In turn, subjective norms are the multiplicative product of (a) one’s normative perceptions about a specified group of salient referents, and (b) his or her motivation to comply with these same individuals.

Similar to attitudes, a small but growing body of research has explored the influence of health message exposure on subjective norms. For instance, a recent campaign initiative completed by Frank and others (2012) demonstrated that messages disseminated through the mass media could have an indirect influence on the subjective norms of the target audience. However, current work has yet to explore whether or not message evaluation significantly predicts subjective norms. As such, the next research question is posed:

Research Question 3: Will message evaluation predict subjective norms about vaccination behavior?

Moving through the TPB model, ample evidence, including meta-analytic work, has clearly identified a link between subjective norms and behavioral intent (Cooke & French, 2008). The relationship between these two variables has been supported in several vaccination studies as well (Dempsey, Zimet, Davis, & Koutsky, 2006; Gerend & Shepard, 2012). For instance, Dempsey, Zimet, Davis, and Koutsky (2006) reported that parents who perceived themselves to
be under social pressure from peers and physicians to have their child vaccinated were more inclined to allow their child to receive the HPV vaccine. Another investigation demonstrated similar findings. Specifically, Gerend and Shepard (2012) found favorable normative perceptions toward the HPV vaccine to predict stronger vaccination intentions among college-aged women. With this information, the next hypothesis is posed:

Hypothesis 3: Subjective norms will positively predict vaccination intent.

**Perceived behavioral control.**

The third and final antecedent variable in the TPB model is perceived behavioral control (PBC). Perceived behavioral control is one’s perceived ability to engage in a specified behavior (Ajzen, 2002). Ajzen (1991) identified perceived behavioral control as a construct that is similar to self-efficacy. Specifically, this construct is “concerned with judgments of how well one can execute courses of action to deal with prospective situations” (Bandura, 1982, p. 122). In other words, perceptions of behavioral control stem from an individual’s control beliefs, or their beliefs that the presence of a factor may further or hinder their performance of a particular behavior (Ajzen, 2002).

Already, numerous investigations have demonstrated that message exposure can influence personal perceptions of self-efficacy (Maibach, Flora, & Nass, 1991). However, existing work has yet to explore whether message evaluation can significantly predict vaccination intent. As such, the next research question is posed:

Research Question 4: Will message evaluation predict perceived behavioral control over vaccination behavior?

Moving back to the traditional model of planned behavior, perceived behavioral control has been identified as the final variable to predict behavioral intent. Already, meta-analytic
investigations have established PBC as a moderate to strong predictor of behavioral intent (Cooke & French, 2008). In these investigations, stronger perceptions of behavioral control resulted in stronger intentions to engage in a particular behavior. These results have been found in vaccination domains as well. Most recently, perceived behavioral control was identified as a significant and positive predictor of intent to obtain the HPV vaccine among college-aged women (Juraskova et al., 2012). Based on these dynamics, the next hypothesis is posed:

**Hypothesis 4:** Perceived behavioral control will positively predict vaccination intent.

**Behavioral intent.**

Behavioral intent is one’s resolve or willingness to engage in a specific behavior. According to the theory of planned behavior, intentions to engage in a particular behavior are a function of an individuals’ attitudes, perceptions of social pressure, and perceived ability to engage in the behavior (Ajzen, 2002). Within the TPB model, intention is assumed to be a direct antecedent to actual behavioral engagement. A notable meta-analysis established a positive, moderate, and consistent average effect size between intent and behavioral engagement (Cooke & French, 2008). Vaccination research has demonstrated the connection between vaccination intent and actual vaccination receipt (Gerend & Shepard, 2012).

**Protection Motivation Theory**

The next framework of focus is protection motivation theory. Protection motivation theory (PMT) is an approach that explains the relationship among fear appeals, persuasive communications, cognitive processes, and health behaviors. PMT has been used to explain why people decide to (or not to) engage in various health behaviors, including vaccination behaviors (Gainforth, Cao, & Latimer-Cheung, 2012). Since the original conceptualization in 1975, this
theory has been revised numerous times. In recent years, PMT has been revised in a manner that is predictive of behavior in diverse health contexts.

Originally, Rogers (1975) created protection motivation theory (PMT) as a way to predict and explain the impact fear appeals can have on the perceptions and behaviors of message recipients. This approach was devised in an attempt to parcel out inconsistent findings in the literature on fear appeals (Boer & Seydel, 1996; Rogers, 1975). In this conceptualization, protection motivation was hypothesized to be the multiplicative function of three variables; severity, vulnerability, and response-efficacy.

After obtaining equivocal findings from tests of the multiplicative model (Boer & Seydel, 1996; Rogers & Mewborn, 1976; Rippetoe & Rogers, 1987), Rogers reframed PMT to provide a more general explanation of persuasive communications. The new additive model was no longer so narrow in scope that it only explained the cognitive responses associated with imagery intended to invoke fear. The revised model drew from the work of Lazarus (1966) and Leventhal (1970) to explain how humans respond to persuasive communications. An example of the 1983 revised model can be found in Figure 3.
The reframed PMT model diverged in many ways from the 1975 formulation. First, additional stimulus variables such as observational learning, past experience, and personality were incorporated into the latter model (Rogers, 1983). Second, the relationships between the focal constructs were hypothesized to be additive (rather than multiplicative). Third, the 1983 model was expanded to incorporate additional concepts, including maladaptive response rewards, self-efficacy, and response costs. Along with the pre-existing constructs, these variables were organized into two independent cognitive mediating processes that were labeled as threat appraisal, and coping appraisal (Boer & Seydel, 1996).

The revised (Rogers, 1983) PMT model proposed that an individual’s reaction to persuasive communications was a function of his or her (a) perceptions of the magnitude of a
specific threat, and (b) perceived efficacy of existing coping methods. The threat appraisal
process occurred when an individual decided what type of response (i.e., adaptive or
maladaptive) should be taken to deal with a perceived threat (Boer & Seydel, 1986; Floyd et al.,
2000). In this process, threat perceptions (i.e., perceptions of severity and susceptibility) would
be subtracted from beliefs about the rewards that would be acquired from engaging in a
maladaptive coping response.

The second process identified was coping appraisal. Milne and Orbell (2000) defined
coping appraisal as “an individuals’ assessment of the recommended coping response…” (p. 54)
to deal with a specific risk. As illustrated in Figure 3, coping appraisal occurs when one
subtracts his or her overall perception of efficacy in fighting a particular threat (i.e., self-efficacy
plus response efficacy) from the costs incurred by responding to it. In turn, an individual would
be more inclined to engage in an adaptive response if he or she felt as though his or her self-
efficacy and response-efficacy outweighed the costs of responding. While the 1983 design
initially generated minimal success, this composition of the theory failed to replicate in many
contexts.

Recent applications of this framework have once again re-conceptualized the placement
and structure of the focal variables. Specifically, the most recent adaptation of PMT presents the
individual concepts from the 1983 framework as independent predictors of protection motivation
(or behavioral intent). The most recent formulation of protection motivation theory (See Figure
4) has consistently achieved success with the model that identifies susceptibility, severity,
maladaptive response rewards, self-efficacy, response efficacy, and response costs (or select
combinations of these variables) as independent predictors of protection motivation (Kim, Jeong,
& Hwang, 2012; Beirens et al., 2008).
Susceptibility.

Perceived susceptibility is defined as how likely an individual believes it is that he or she will be impacted by a particular threat (Brewer et al., 2007). Within the context of health, susceptibility is usually measured as vulnerability to a particular disease or health problem. Already, perceived susceptibility has been identified as a critical concept in numerous investigations related to health promotion (Brewer et al., 2007; Bish, Yardley, Nicoll, & Michie, 2011; Cho, Sands, & Wilson, 2011).

A small, but growing, body of literature has found that exposure to health messages can influence one’s perceived susceptibility to a particular disease and/or health concern. For example, Jackson et al. (2010) determined that exposure to anti-smoking PSAs increased one’s feelings of susceptibility to cancer. However, these investigations have yet to explore the mediating role that message evaluation may play in this process. As such, the next research question is posed:

Research Question 5: Will message evaluation predict perceived susceptibility to disease?

Turning to outcomes associated with susceptibility, meta-analytic research has summarized the results of previous work and has found a consistent and positive average correlation between perceived susceptibility and behavioral intent (Floyd et al., 2000) including vaccination intent (Brewer et al., 2007). In these situations, individuals who perceive themselves to be vulnerable to a health threat will be more likely to engage in a health protective action. For instance, Armstrong and associates (2001) found that low-income adults who perceived themselves as susceptible to contracting the flu; were more likely to be vaccinated than those
who did not consider themselves to be vulnerable to contracting the seasonal influenza. Drawing on this evidence, the next hypothesis is posed:

Hypothesis 5: Perceived susceptibility to disease will positively predict vaccination intent.

Severity.

Perceived severity refers to the degree of harm that an individual believes a focal threat will cause (Norman, Boer, & Seydel, 2005). In health contexts, perceived severity is usually measured as how serious an individual considers a disease or health concern to be. Similar to susceptibility, perceived severity is frequently included in investigations related to risk and health behavior (Bish et al., 2011). Perceived vulnerability to a particular disease and/or medical issue can be influenced by exposure to health messages. However, extant research has yet to explore the key role that one’s evaluation of messages may play in the process between message exposure and behavioral outcomes. To rectify this gap, the following research question is posed:

Research Question 6: Will message evaluation predict perceived severity of disease?

Meta-analytic research has demonstrated consistent and positive average effect sizes between perceived severity and behavioral intent (Floyd et al., 2000), including vaccination intent (Brewer et al., 2007). In these situations, individuals who considered the outcomes of a specific threat to be severe were more inclined to engage in protective actions. For example, Evans and Watson (2003) found a significant, positive and moderate association between perceived severity and influenza vaccination behavior among older adults. As such, the next hypothesis is posed:

Hypothesis 6: Perceived severity of disease will positively predict vaccination intent.

Maladaptive response rewards.
Moving to the next variable of interest, maladaptive response rewards are the benefits (both intrinsic and extrinsic) that a person expects to accrue from engaging in a maladaptive method of coping to deal with an existing threat (Floyd et al., 2000). Higher perceived maladaptive response rewards will lower the likelihood that an individual adopts a recommended course of action to deal with a health threat. Depending on the actual threat, examples of maladaptive responses may include avoidance and/or destructive behaviors.

In response to information about the threat of a potential flood, Grothman and Reusswig (2006) identified denial and wishful thinking as two maladaptive coping responses that members of a German community engaged in. The potential rewards reaped from engaging in these maladaptive coping methods could include saving money (in the short term) by not investing in precautionary measures and/or not having to concern one’s self with fear associated with the potential impact a flood could have on the community. Similar to the previously explicated social cognitive constructs, few investigations have explored the relationship between message exposure, evaluation and perceived rewards (Glendon & Walker, 2013). Given this evidence, the next research question is posed:

Research Question 7: Will message evaluation predict perceived maladaptive vaccination response rewards?

Maladaptive response rewards are one of the most infrequently assessed constructs in the protection motivation framework. In a meta-analysis, Floyd and others (2000) noted that only six studies (which fit the inclusion criteria) examined the relationship between response rewards and behavioral intent. By contrast, the relationship between more commonly used variables such as response-efficacy, self-efficacy, and behavioral intent had been assessed in 36 and 41 of the studies that met the inclusion criteria, respectively. As a result, no known examinations have
measured the relationship between maladaptive response rewards and vaccination intentions. In this domain, potential rewards for engaging in the maladaptive response (i.e., not having one’s child vaccinated) could include not having to worry about the safety of the vaccine, not having to deal with taking one’s child to the physician, and not having to worry about one’s child having an adverse reaction to the vaccine. Based on this gap in the literature, the next hypothesis is posed:

Hypothesis 7: Maladaptive response rewards will negatively predict vaccination intent.

Response efficacy.

Response and self-efficacy are additional factors included in the protection motivation model. While self-efficacy has already been defined via the similar concept of perceived behavioral control (Ajzen, 1991), response efficacy will be explained in greater detail.

Response efficacy is a person’s perception of how effective a specified recommendation may be at reducing a health threat (Rogers, 1983). In terms of vaccines, an individual’s perception of response efficacy would be dependent on how effective he or she considered a vaccination to be in disease prevention. To date, message exposure has been found to influence peoples’ perceptions of response efficacy. However, similar to the previously specified protection motivation variables, existing work has yet to determine whether message evaluation plays a role in this process. With this, the next research question is presented:

Research Question 8: Will message evaluation predict vaccination response efficacy?

Already, response efficacy has been established as a consistent predictor of health behavior. The meta-analysis completed by Floyd et al., demonstrated a consistent and positive average effect size between response efficacy and intent. Recent literature has identified response efficacy as a predictor of numerous health behaviors including vaccination intent (Mline et al., 2000; Krieger, Kam, Katz & Roberto, 2011). Among the most relevant and recent
investigations Krieger, Kam, Katz, and Roberto (2011) found that perceptions of response efficacy, or how effective the HPV vaccine would be in protecting against the disease, were significantly and positively correlated with vaccination behaviors among college-aged females. Therefore, we posed the following hypothesis:

Hypothesis 8: Response efficacy will positively predict vaccination intent.

**Response costs.**

Response costs are beliefs about “how costly performing the recommended response will be to the individual” (Milne et al., 2000, p. 109). Here, costs are not necessarily defined in monetary terms. Costs can cover any type of resource an individual needs to respond including time, familial support, and money. The lower the costs of the response, the more likely one will be to engage in a recommended health behavior.

Already, negative associations have been found between message exposure and response costs. Specifically, a negative association was demonstrated between exposure to messages about a pandemic threat and perceived costs of engaging in protective action against the threat (Teasdale, Yardley, Scholtz, & Michie, 2012). In spite of these findings, existing work has yet to explore the influence that evaluations of messages may have on perceptions of response costs. As such, the following research question is posed:

Research Question 9: Will message evaluation predict vaccination response costs?

Turning back toward the outcomes associated with response costs, a person is likely to engage in an adaptive response behavior if they do not consider the behavior to have a high cost. Already, response costs have been linked to behavioral intent. Summarizing the results of fifteen studies that assessed the relationship between these two variables, Floyd and others reported that response costs had a significant influence on behavioral intent. Building on this information, the next hypothesis is posed:
Hypothesis 9: Response costs will negatively predict vaccination intent.

**Protection motivation.**

Protection motivation serves to mediate the relationship between perceived severity of disease, perceived susceptibility to disease, response costs, maladaptive response rewards, response efficacy, self-efficacy and behavioral engagement (See Figure 4). Protection motivation has been deemed comparable to behavioral intent. One’s level of protection motivation will determine whether he or she will initiate, continue, or cease an adaptive or coping behavior in response to threat-relevant information. In sum, PMT poses that an individual will engage in protective actions if (a) he or she considers him or herself to be susceptible to a health threat, (b) the threat is believed to be severe, (c) the recommended response is considered to be effective, (d) the focal individual believes that he or she has the ability to partake in the recommended response behavior, and (e) the individual does not believe considerable costs will be incurred by engaging in an adaptive coping response.

![Figure 4. Current Conceptualization of Protection Motivation Theory](image-url)
Fear.

Although the previous description provides an in-depth explanation of the cognitive constructs included in protection motivation, one variable is omitted from this description. Specifically, fear is one focal construct whose role in the protection motivation model has been debated. While the initial structure of protection motivation theory highlighted the role that fear may play in influencing threat perceptions (Rogers, 1975; Rogers 1983), this concept has been ignored in practical applications of the theory (Kim, Jeong, & Hwang, 2012; Gainforth, Cao, & Latimer-Cheung, 2012; Floyd et al., 2000).

Even though fear has been omitted from many protection motivation investigations, this construct has been utilized frequently in health campaign domains. Most often, the objective of these campaign initiatives is to influence outcomes by inducing fear in members of the target audience. While some campaign initiatives have successfully induced fear among target audience members others have not (Ruiter, Abraham, & Kok, 2001; Slavin et al., 2007). Given this, it is important to definitively determine whether the messages manipulated in the present investigation effectively induce fear among target audience members. Therefore, the next hypothesis is posed:

Hypothesis 10: A health message that is manipulated to induce fear will be considered more frightening than a message that is not designed to induce fear.

Moving on to outcome variables associated with fear, Milne et al. (2000) reported that fewer protection motivation investigations provided associations between fear and behavioral measures (i.e., intent, concurrent behavior, & subsequent behavior), than associations between behavioral intent and most other antecedent constructs.
As noted, fear is a variable that was included in the original conceptualization of protection motivation theory, yet, has rarely been tested empirically. Moreover, in the few practical applications in which the construct of fear has been explored, this concept has been significantly and positively correlated with certain antecedents to protection motivation.

In particular, moderate and positive associations have been demonstrated between perceived susceptibility, perceived severity, and fear. These positive associations are unsurprising given that greater perceptions of susceptibility and severity would likely result in stronger feelings of fear. Given this, fear may actually mediate (or partially mediate) the relationship between susceptibility, severity, and behavioral intent. To address this issue, the next research questions are presented:

Research Question 10: Will fear mediate the relationship between perceived susceptibility of disease and vaccination intent?

Research Question 11: Will fear mediate the relationship between perceived severity of disease and vaccination intent?

**Personal responsibility.**

Another variable that could mediate the relationship between social-cognitive constructs and behavioral intent is personal responsibility. Drawing on previous research, Yun and Colleagues (2009) define personal responsibility as “the attribution of outcomes resulting from health or unhealthy behaviors to the self” (King, 1982; Rothman, Salovey, Turvey, & Fishkin, 1993). This concept is especially relevant in the domain of vaccinations because vaccination efforts are unique to many other health behaviors in the sense that an individual’s vaccination choice has the potential to directly influence the health and welfare of others in his or her community who are unable to be vaccinated or are resistant to the vaccine.
Previous work by Morgan and Miller (2002) found that people who scored significantly higher in altruism were more likely than their non-altruistic counterparts to engage in pro-social behaviors (i.e., registering as an organ donor). Further elaborating on the impact that altruistic tendencies have on pro-social behaviors, Anker and Feeley (2011) drew from Latane and Darley’s (1969) bystander intervention theory to model the process through which an individual decides to engage in a pro-social behavior. Through this investigation, the authors found that taking personal responsibility for the U.S. organ shortage significantly predicted one’s status as an organ donor. However, prior to doing so, an individual must have noticed a specific issue, and interpreted that issue as a threat to the health and welfare of others and have knowledge on how to help.

Using this information, the present analysis seeks to determine whether feelings of personal responsibility mediate the relationship between traditional TPB constructs and behavioral intent within the context of information seeking and childhood vaccinations. Therefore, the next research questions are presented:

Research Question 12: Will personal responsibility mediate the relationship between attitudes toward vaccination and vaccination intent?

Research Question 13: Will personal responsibility mediate the relationship between subjective norms and vaccination intent?

Research Question 14: Will personal responsibility mediate the relationship between perceived behavioral control and vaccination intent?

Information Seeking

While formal campaign and activist initiatives frequently disseminate messages to the public, many consumers tend to seek out information about health disease and/or concerns on
their own as well. To accurately account for the various types of information that consumers may have previously sought out, information seeking must be assessed in tandem with general exposure to health messages.

Information seeking is the active, goal-directed effort, in which consumers search for facts to satisfy some type of desire or need (Niederdeppe et al., 2007). Information seeking occurs in response to uncertainty about one’s health (Guillaume & Bath, 2004) or an action taken regarding one’s health. The seeking process is distinct from information and/or media exposure in that this action typically occurs when an individual actively and purposely seeks out information to satisfy some type of informational desire.

In 2012 alone, studies examined information seeking behaviors with respect to various health topics including the H1N1 flu vaccine (Allen Catellier & Yang, 2012), cancer treatment (Davidson & Breckon, 2012) and mammograms (Weeks, Friendenberg, Southwell & Slater, 2012). Pertinent to the present investigation, evidence indicates that parents are actively seeking out information pertaining to their children’s health and childhood vaccinations (Guillaume & Bath, 2004; Kennedy et al., 2011).

**Gender.**

Gender is one antecedent to information seeking behaviors. In particular, women are more inclined to seek out health treatment information from both traditional (e.g., friends & family, radio, TV) and online sources (e.g., websites), (Dobransky & Hargittai, 2012). Dobransky & Hargittai (2012) found that gender significantly predicted online health information seeking. Results from this investigation found that women were more likely to seek out information about specific medical problems, over-the-counter drugs, and/or a particular doctor or hospital. Also, through the Health Information and National Trends Survey, Rutten,
Squires, & Hesse (2006) found that women were more inclined to seek out cancer-related information than males. Using this information, the next hypothesis in the present investigation is posed:

**Hypothesis 11:** Female gender will predict information seeking behavior.

**Source utilized.**

In spite of the large amount of information seeking work completed in recent years, a relatively small percentage of these studies draw on participants to determine which types of sources information consumers are using. Among the few studies that do this, it has been determined that health professionals and the Internet are the sources commonly used by consumers to seek out health information (Carpenter et al., 2011; Kennedy et al., 2011; Lee, Ramirez, Lewis, Gray, & Hornik, 2012; Oh et al., 2011; Tustin, 2010).

The existing evidence illustrates that source utilization may vary by health topic. For instance, Lee, Ramirez, Lewis, Gray and Hornik (2012) found that more cancer patients sought out treatment and quality of life information from medical personnel (i.e., personal physician, other physician, health professional) than any other source. In contrast to this, Tustin (2012) found that many information consumers were using Internet sources in tandem with (or in place of) advice from physicians.

Given these apparent discrepancies in information source utilization, it is important to determine what sources current and/or future parents of young children are using to seek out health information on childhood vaccines. With this, the final research question is posed:

**Research Question 15:** What sources do parents use to find information on the MMR vaccine?

**Information Seeking and Planned Behavior**
Moving to the outcomes of information seeking, a new investigation completed by Yang (2012) was one of the first to assess the behavioral outcomes associated with online health information seeking. Specifically, Yang determined that online health information seeking was directly related to intentions to receive the H1N1 vaccine among college students. While Yang and others have drawn on the theory of planned behavior to assess the impact that (1) attitudes toward information seeking, and (2) informational subjective norms have on intentions to seek out information (Yang & Kahlor, 2012; Yang et al., 2011), TPB variables (i.e., attitudes toward specified health behavior, perceptions of subjective norms focused on a specified health behavior, and perceptions of self-efficacy regarding a focal health behavior) have not yet been hypothesized as mediators of the relationship between information seeking and behavior.

Given that passive exposure to campaign information disseminated through mass-media and mediated sources (e.g., print materials, PSAs, billboards, & websites) have been associated with attitudes toward health behaviors and health behavior change it is necessary to determine whether or not (and to what degree) information purposely sought out by consumers influences actual health behaviors.

To rectify this gap and expand current research, the present investigation seeks to examine the impact that the information seeking process has on attitudes, subjective norms, and perceived behavioral control. As such, the next hypotheses are proposed:

Hypothesis 12: Information seeking will predict attitudes toward vaccination.

Hypothesis 13: Information seeking will predict subjective norms toward vaccination.

Hypothesis 14: Information seeking will predict perceived behavioral control over vaccination.
Taken together, the present investigation explores the influence relevant communication, psychology, and health behavior variables have on vaccination decisions among parents and prospective parents of young children. A primary objective of this investigation is to explore the influence that messages with manipulated levels of source credibility and fear have on childhood vaccination intentions among parents.

A secondary goal of this work is to explore the vaccination decision making process among parents of young children. In particular, these secondary goals are to (a) understand the relationship between message evaluation and social-cognitive constructs, (b) examine the impact that feelings of personal responsibility have on vaccination intent, and (c) determine the role that active/purposeful information seeking efforts play in vaccination decision-making among parents. The proposed model of this process can be found in Figure 5.
Chapter 3
Pilot Study

Purpose

The purpose of the pilot study was to gain a greater understanding of select variables that would be measured in the full-fledged investigation. Given that personal responsibility is a relatively new concept, which has been explored in limited applications (Yun et al., 2009; Anker & Feeley, 2011), it was necessary to adapt existing measures and determine whether or not this variable would correlate with select social cognitive constructs. In contrast with the experimental design of the full-fledged study, the pilot study was designed as a one-shot survey which utilized a convenience sample.

Participants

Participants were parents with children between the ages of 0-12 months old. Parents with children within this age range were recruited because children do not typically receive the MMR vaccine until 15 months of age. Potential respondents were recruited through email messages distributed via a graduate and faculty/staff listserv at a major northeastern university.

Procedure

The data was collected through a one-shot survey. Upon entry to the survey site, respondents were provided with an informed consent document, which illustrated the risks/benefits to participation and the anonymous nature of data collection. Next, participants completed an online survey to assess risk perceptions, personal responsibility, self-efficacy, and vaccination intent. The Institutional Review Board at the Researcher’s home institution approved all procedures.

Measures
Sample characteristics.

Participants were asked to provide personal information regarding their sex, age, education level, marital status, and income. Participants were then asked to provide the age and sex of their youngest child. When completing all other measures, respondents were instructed to consider their experiences with their youngest children (if relevant).

Perceived severity.

A 7-point Likert scale ranging from “strongly disagree” to “strongly agree” was used to measure perceived severity of the illnesses that the MMR vaccination protects against. In separate questions, participants were asked to indicate whether they consider the (1) measles and (2) mumps to be a serious problem. Participants were not queried about rubella because it has been eradicated in the United States.

Perceived susceptibility.

Perceived susceptibility, or the expectancy that one’s child will be exposed to the measles or mumps, was assessed using 2-items measured along a 7-point Likert scale ranging from “strongly disagree” to “strongly agree.” In these questions, participants were queried as to whether they believed their child would eventually contract the (1) measles or (2) mumps without the vaccine. Perceived susceptibility and perceived severity scores were summed and averaged to create an aggregate risk perception score for each participant. Higher scores along this scale denoted greater perceptions of risk.

Self-efficacy.

Self-efficacy, or one’s perception of his or her ability to obtain the vaccination for his or her child, was measured with an adapted version of a scale created by Armitage and Conner (1999). The four scale items: (1) I believe I have the ability to get my child vaccinated with the
MMR vaccine, (2) I see myself as capable of getting the MMR vaccine for my child, (3) I am confident that I will be able to obtain the MMR vaccine for my child, and (4) If it were entirely up to me, I am sure I would have my child vaccinated with the MMR vaccine, ranged on a 7-point scale from “strongly disagree” to “strongly agree.” Scores were summed and averaged to create an aggregate self-efficacy score for each participant. Higher scores illustrated more efficacious feelings.

**Personal responsibility.**

Four items adapted from Anker and Feeley (2011) measured participants’ feelings of responsibility to help protect others against an outbreak. Respondents noted their level of agreement with the following statements: (1) I believe it is my personal responsibility to have my child vaccinated with the MMR vaccine, (2) I feel responsible for taking actions against the measles and/or mumps, (3) It is my duty to have my child vaccinated with the MMR vaccine, and (4) Having my child vaccinated can help protect other people from the measles or mumps. Again, the items were measured along a 7-point scale “strongly disagree” to “strongly agree” in which higher scores were indicative of stronger agreement. An average responsibility score was created for each participant.

**Behavioral intent.**

Behavioral intent, or one’s resolve to have his or her child vaccinated, was measured through an adapted version of a 4-item scale developed by Armitage, Conner, Loach, and Willets (1999). Specifically, participants were asked to indicate if they (1) intend, (2) plan, (3) want, and (4) hope to have their child vaccinated with the MMR vaccine in the near future. Answers were denoted along a 1 “strongly disagree” to 7 “strongly agree” scale, with higher scores illustrating
stronger feelings of intent. Item scores were summed and averaged to create an average
behavioral intent score for each participant.

Results

Demographics.

143 individuals participated in the pilot test. The sample consisted of more women \( n = 98, 69\% \) than men \( n = 45, 31\% \). Participants were primarily White \( n = 102, 71\% \) with additional individuals reporting as Asian \( n = 10, 7\% \), Black/African-American \( n = 9, 6\% \), Latino/Hispanic \( n = 5, 3\% \), and other \( n = 10, 6\% \). All respondents had children under the age of 12 months that had not yet received the vaccine. On average, participants’ children were 6.25 months old \( (SD = 2.87) \).

Associations among constructs.

Moderate associations were found among most measured variables. Specifically, a relationship existed between risk perceptions and feelings of personal responsibility \( (r = .27, p < .01) \). Another strong correlation emerged between self-efficacy and personal responsibility \( (r = .27, p < .01) \). In addition to this, associations were found between gender and vaccination intent \( (r = .17, p < .05) \); risk perceptions and vaccination intent \( (r = .53, p < .01) \); self-efficacy and vaccination intent \( (r = .17, p < .01) \); and personal responsibility and behavioral intent \( (r = .55, p < .01) \).

Discussion

The pilot test provided critical information pertaining to relationships among focal study constructs, such as risk perceptions, self-efficacy, personal responsibility, and vaccination intent. In particular, this investigation served to reaffirm previously established findings and explore novel relationships between self-efficacy, personal responsibility, and vaccination intent.
Lending support to protection motivation theory, relevant protection-motivation constructs, such as risk perceptions and self-efficacy, were positively associated with vaccination intent. Furthermore, the strength of these associations mirrored the strength of effect sizes derived from similar investigations.

Moving toward the more novel findings, this investigation was the first of its kind to assess the relationship between self-efficacy (or perceived behavioral control) and personal responsibility. Specifically, the results established a moderate, and positive association between the two variables. The results signal that as feelings of perceived ability to engage in a particular behavior increase, one’s feelings of personal responsibility to engage in the behavior may do so as well.

Multiple explanations could account for this finding. For instance, one’s perceived ability to partake in a specific behavior may be necessary to enact feelings of personal responsibility. In other words, an individual must feel as though his or her personal (or family’s) needs are fulfilled prior to feeling personal obligation to help others. An individual that has already obtained the resources required to vaccinate his or her child would be more inclined to consider what is best for community health, than those who do not currently have the ability to fulfill their personal (or their families) needs.

Another potential explanation is that an individual who does not believe that he or she has the resources required to obtain the vaccination for his or her child may engage in avoidance behaviors. To alleviate his or her worry or concern, this person may actively avoid thinking about the diseases that his or her child (and the rest of the community) may be more vulnerable to as a result of his or her child’s non-vaccinated status.
Results from the initial pre-test provide unique insight and information about the relationship between relevant protection motivation and emotional variables. Specifically, this research was among the first to demonstrate the key role that personal responsibility may play in health-decision making. While this investigation was a useful first-step toward unpacking the relationship between novel and traditional health behavior constructs, additional considerations need to be taken into account when attempting to understand the vaccination decision-making process. Specifically, causal, rather than correlational relationships need to be established among focal constructs. Additionally, all potential influences should be assessed when exploring this process. Thus, additional variables need to be accounted for. With this in mind, the full-fledged, comprehensive investigation will be described in full detail.
Chapter 4

Method

Participants

Parents of children 0-4 years of age, expectant parents, and individuals considering child rearing (within the next three years) were recruited for this study utilizing several methods. First, potential respondents were invited to participate via email messages distributed through the graduate and faculty/staff listserv at a large northeastern institution in the United States. Second, respondents were recruited via the dissemination of recruitment materials on popular social networking websites such as Facebook and Reddit. Third, the recruitment invitation was posted to various blogs and websites, which included content on parenting. Although most participants were not compensated, individuals who completed the survey were eligible to win one of three $25 Amazon gift cards. Winners were randomly chosen upon study completion. Survey data was collected through the Questionpro (www.questionpro.com) program.

Procedure

Through recruitment materials, eligible participants were invited to partake in an investigation that measured the impact credibility, message evaluation, information seeking, protection motivation, and planned behavior variables had on MMR vaccination intentions among current (or future) parents of young children. Upon accessing the online survey site, participants were provided with an information sheet, which included a brief description of the study, the costs and benefits associated with participation, and the anonymous nature of data collection. All procedures for this study were approved by the Institutional Review Board.

Experimental Stimuli
After respondents agreed to take part in the study, they were randomly assigned to experimental conditions, based on birth month. The two conditions manipulated in this study were source credibility (high; low) and fear (high; low). Specifically, source credibility was manipulated based on the profession of the message source. The message source was either (1) a fictional pediatrician named Marsha Harris (high source credibility condition), or (2) the actress Reese Witherspoon (low source credibility condition).

The level of fear aroused was manipulated through the text of the message. The high fear condition listed the most frightening outcomes associated with the measles and mumps. In addition to this, the high fear condition included a picture of a child sick with the mumps. By contrast, the low fear condition listed less frightening outcomes associated with the diseases and featured a photo of a seemingly healthy child. All experimental stimuli can be found in Appendix A.

It is important to note that, across all four conditions of this 2 x 2 experimental design, participants were informed about risks associated with the measles and mumps. They were also informed that the MMR vaccine is an effective method of disease prevention in children.

After exposure, respondents were asked to answer a number of questions related to cognitions, feelings, and vaccination intentions. Participants with children were asked to consider their experiences with their youngest child. Participants without children were asked to consider potential experiences with future children.

Measures

Sample characteristics.

Respondents were asked about their gender, ethnicity, age, education, marital status, income, and insurance status. When relevant, participants were also asked about the demographic
characteristics of their youngest child. Specifically, they were asked to specify the age, gender, and vaccination status of their youngest child.

**Source credibility.**

After exposure to the experimental stimulus, participants were queried on their overall perceptions of trustworthiness and expertise of the message source. This variable was measured using an adapted version of a 7-point semantic differential scale originally developed by Ohanian (1990). The 7-item scale used various bi-polar adjectives to assess credibility (i.e., trustworthy-not trustworthy, believable-not believable, credible-not credible, knowledgeable-not knowledgeable, reliable-unreliable, experienced-not experienced & expert-novice). Individual item scores were summed and averaged to create a total credibility score for each participant ($\alpha = .88$).

**Message evaluation.**

A 4-item scale was used to measure one’s evaluation of the message presented in the experimental stimuli. These items were adapted from a scale developed by van den Berg, Manstead, van der Pligt, and Wigboldus (2005). Respondents were asked to report on the usefulness of the message by noting whether it was (a) satisfying, (b) useful, (c) helpful, and (d) valuable. Responses were denoted along a 7-point Likert scale, ranging from “strongly disagree” to “strongly agree.” Scores on each item were compiled and averaged to create an aggregate message evaluation score ($\alpha = .90$).

**Attitudes.**

Attitudes toward the vaccine, or whether or not an individual considers the vaccine to be beneficial, were assessed via six items. Respondents were asked to indicate their level of agreement with the following statements (a) the MMR vaccine is safe, (b) the MMR vaccine is
healthy, (c) obtaining the MMR vaccine is a wise decision, (d) my overall attitude toward the MMR vaccine is favorable, (e) my overall attitude toward the MMR vaccine is good, (f) my overall attitude toward the MMR vaccine is positive. Answers were measured along a 1-7 scale ranging from “strongly disagree” to “strongly agree.” All items were averaged to create a total attitude score for each participant ($\alpha = .87$).

**Subjective norms.**

Subjective norms, or perceptions about how important salient individuals in one’s life consider the MMR vaccination to be. First, participants were queried on their normative perceptions. Specifically, they were asked to indicate their level of agreement with the statement that their (a) parent(s), (b) spouse, (c) sibling(s), (d) peers and (e) close friends would want their child vaccinated with the MMR vaccine. After this, respondents were asked about their motivation to comply with these individuals. Participants were asked to denote their level of agreement with the statement that their (a) parent(s), (b) spouse’s, (c) sibling(s), (d) peers’ and (e) close friends’ opinions about the MMR vaccine are important to them. For both of these questions, answers were measured along a 1-7 scale ranging from “strongly disagree” to “strongly agree.” Scores for normative perceptions and motivation to comply were summed and averaged independently. After which, the average scores for each variable were multiplied to calculate the aggregate subjective norms variable ($\alpha = .91$).

**Perceived behavioral control.**

Perceived behavioral control, or an individual’s perception of his or her ability to obtain the MMR vaccination for his or her child, was measured using a modified version of a scale created by Armitage and Conner (1999). The five scale items include: (a) I believe I have the ability to get my child vaccinated with the MMR vaccine, (b) I see myself as capable of getting
the MMR vaccine for my child, (c) I am confident that I will be able to obtain the MMR vaccine for my child, (d) if it were entirely up to me, I am sure I would have my child vaccinated with the MMR vaccine, and (e) I believe the MMR vaccine is affordable. Answers ranged along a 7-point scale from “strongly disagree” to “strongly agree.” All five items were averaged to create a total behavioral control score for each participant ($\alpha = .88$).

**Perceived severity.**

A 6-item scale adapted from McClendon, Prentice-Dunn, Blake, and McMath (2002) was used to measure how serious respondents considered the measles and mumps to be. In particular, participants were asked about their agreement with the following statements: (a) the measles are not a serious problem in the USA, (b) the mumps are not a serious problem in the USA, (c) if my child does not receive the MMR vaccine he or she may become very ill, (d) if my child does not receive the MMR vaccine, he or she may have to be hospitalized, (e) if my child does not receive the MMR vaccine, he or she may get very sick with the measles, (f) If my child does not receive the MMR vaccine, he or she may get very sick with the mumps. Responses were measured along a 7-point scale ranging from “strongly disagree” to “strongly agree.” Scores on individual items were aggregated and averaged to create an index severity score for each participant ($\alpha = .89$).

**Perceived susceptibility.**

Perceived susceptibility, or the expectancy that one’s child will be exposed to the measles or mumps was measured with 5-items along a 7-point likert scale (McClendon et al., 2002) ranging from “strongly disagree” to “strongly agree.” Participants were asked about their level of agreement with the following statements: (a) my child will not catch the mumps, (b) my child will not catch the measles, (c) I will increase my child’s chances of getting the mumps if I do not
seek out the MMR vaccine, (d) I will increase my child’s chances of getting the measles if I do not seek out the MMR vaccine, (e) even without the vaccine, my child will not get sick.

Individual item scores were summed and averaged to create a total susceptibility score for each participant ($\alpha = .91$).

**Response efficacy.**

Response efficacy, or how effective the MMR vaccine is in preventing the measles and mumps, was measured using 5-items measured along a 7-point scale Witte, McKeon, Cameron, and Berkowitz (1995). Specifically, participants were asked to indicate their level of agreement with the following statements: (a) the MMR vaccine is effective in preventing the measles, (b) the MMR vaccine is effective in preventing the mumps, (c) the MMR vaccine is the best way to prevent the measles, (d) the MMR vaccine works to prevent the mumps in children, and (e) the MMR vaccine works to prevent the measles in children. Item scores were summed and averaged to create a response efficacy index for each participant ($\alpha = .86$).

**Maladaptive response rewards.**

Maladaptive response rewards, or the benefits that one would accrue from not engaging in the recommended protective response, were measured with 5-items. Respondents were asked to report whether they (a) will not have to worry about their child having autism, (b) will not have to worry about their child having a learning disability, (c) will not have to worry about the safety of the vaccine, (d) will not have to worry about their child having too many vaccines at once, and (e) will not have to spend money on the vaccine, if they do not have their child vaccinated with the MMR vaccine. Respondents denoted answers along a 7-point scale ranging from “strongly disagree” to “strongly agree.” All five items were averaged to create a total rewards score for each participant ($\alpha = .85$).
**Response costs.**

Response costs, or the resources an individual expends by engaging in the recommended behavior, were measured with 5-items. Respondents reported whether or not protecting their child against the (a) measles and (b) mumps takes a considerable amount of effort. Participants were also asked whether or not taking their child to receive the vaccine is (a) time consuming or (b) difficult. Finally, participants were queried on whether they believe the MMR vaccine is expensive. Individual item scores were summed and averaged to create a total cost score for each participant ($\alpha = .80$).

**Fear.**

Four items measured how alarmed participants were by the diseases that the MMR vaccination protects against. Specifically, participants were asked to indicate their agreement with the following statements: (a) I am afraid that my child will catch the mumps, (b) I am afraid that my child will catch the measles, (c) I am fearful that my child will catch the mumps, (d) I am fearful that my child will catch the measles. Respondents were able to answer along a 7-point scale ranging from “strongly disagree” to “strongly agree.” Individual item scores were summed and averaged to create a total fear score for each participant ($\alpha = .86$).

**Personal responsibility.**

Six items adapted from Anker & Feeley (2011) assessed participants’ feelings of responsibility toward protecting others against the measles and mumps. Participants noted their level of agreement with the following statements: (a) I believe it is my personal responsibility to have my child vaccinated with the MMR vaccine, (b) I feel an obligation to have my child vaccinated with the MMR vaccine, (c) I feel responsible for taking actions against the mumps, (d) it is my duty to have my child vaccinated with the MMR vaccine, (e) having my child
vaccinated can help protect other people from the measles, and (f) I feel responsible for taking action against the measles. Again, the items were measured along a 7-point scale “strongly disagree” to “strongly agree.” Individual item scores were summed and averaged to create a total responsibility score for each participant ($\alpha = .92$).

**Behavioral intent.**

Behavioral intent, or an individual’s intent to have his or her child vaccinated, was assessed with an adapted version of a 5-item scale developed by Armitage, Conner, Loach, & Willets (1999). Participants were queried on whether or not they (a) intend and (b) plan have their child vaccinated with the MMR vaccine in the near future. Participants were also asked whether they (c) want and (d) will have their child vaccinated soon. Finally, participants were instructed to denote their level of agreement with the following statement: “when my child is eligible, I wish to have him or her vaccinated with the MMR vaccine.” The items were measured along a 7-point scale ranging from “strongly disagree” to “strongly agree.” Individual item scores were summed and averaged to create a total vaccination intent score for each participant ($\alpha = .89$).

**Information seeking.**

Information seeking behavior was measured with 4-items previously piloted by the author. Respondents were asked whether or not they had previously (a) sought out information, (b) paid close attention to information, (c) made an effort to find information, and (d) actively searched for facts about the MMR vaccine. When answering these questions, respondents were instructed to not include the information that they had been exposed to through the present research effort. Responses were measured along a 1-7 Likert-type scale ranging from “strongly
disagree” to “strongly agree.” Individual item scores were summed and averaged to create a total information seeking score for each participant ($\alpha = .83$).

**Source utilization.**

Sources used to seek out information related to the MMR vaccination were measured with a source utilization scale. Participants were asked if they had sought out health information related to the MMR vaccine from the following sources: (a) health professional, (b) friend(s), (c) family member(s), (d) government health website(s) (e.g., centers for disease control or prevention), (e) non-government health website(s), (f) online blog post, (g) online forum(s), (h) print news article(s), (i) print magazine article(s), (j) online news article(s), (k) online magazine article(s), (l) radio news, (m) televised news, (n) academic journal article(s) and (o) online social network(s). Answers were measured along a 1-7 Likert-type scale ranging from “strongly disagree” to “strongly agree.”
Chapter 5

Results

Preliminary Analyses

Preliminary analyses and descriptive statistics were computed using the Statistical Package for Social Sciences (SPSS). The initial sample contained 645 participants. Given that this research was primarily interested in individuals who had not completed the full vaccination schedule, those who had already obtained the second (and final) vaccine for their youngest child \( (n = 10) \) were removed. An additional 21 cases, which had a high percentage of missing data, \( (>50\%) \) were removed as well. As such, the final sample total was 614 unique participants.

Sample Characteristics

The majority of participants \( (75\%; n = 439) \) were women. Most identified as Caucasian \( (84\%, n = 518) \), Asian \( (8\%, n = 48) \) and other \( (4\%, n = 21) \). The mean age of respondents was 29.82 \( (SD = 5.67) \). The majority of the sample identified as married \( (66\%, n = 403) \), with a smaller percentage reporting their status as single \( (26\%, n = 160) \) or other \( (6\% n = 36) \). The sample was highly educated, with most of the participants having received at least a Bachelors’ degree \( (29\%, n = 176) \), a Masters’ degree \( (40\%, n = 241) \) or a Doctoral degree \( (15\% n = 93) \). Only 11% of the sample had obtained anything less than a Bachelors’ degree \( (n = 71) \).

Just under 50\% \( (n = 300) \) of the sample reported having at least one child and nearly one-fifth of the sample \( (n = 115, 19\%) \) was currently expecting a child.\(^1\) Of those with children, about 200 reported that their youngest child had already received the first round of the MMR vaccine.

The data was tested to determine whether participants who had already received the first round of the vaccine significantly differed on any relevant constructs that those who had not.
Participants who had already obtained the vaccine for their child only scored significantly higher on personal age and age of one’s child. Given that participants who had obtained the first round of the vaccine did not significantly differ on focal study variables (e.g., information seeking, protection motivation, planned behavior), vaccination status was not accounted for in the final model.²

Turning to insurance status, 95% (n = 563) of the sample that answered the question reported that they were currently insured. Another 5% (n = 30) reported that they were currently uninsured. Of those who had children, 94% of the participant population reported that their child was currently insured. Another 6% of this population indicated that their children was not currently covered by a health insurance policy.

**Confirmatory Factor Analysis**

Next, a confirmatory factor analysis was conducted. The primary loading of each variable can be found in Table 1 and Table 2. The CFA results demonstrate that each item measured a single construct.³ All primary factor loadings were above .60. All secondary item loadings remained below .30. As noted in the measures section, all reliability levels were acceptable (<.80). In total, 13 separate factors were derived from the data.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credibility</strong></td>
<td></td>
</tr>
<tr>
<td>1 Trustworthy-Not Trustworthy</td>
<td>0.77</td>
</tr>
<tr>
<td>2 Believable-Not Believable</td>
<td>0.78</td>
</tr>
<tr>
<td>3 Credible-Not Credible</td>
<td>0.84</td>
</tr>
<tr>
<td>4 Knowledgeable-Not Knowledgeable</td>
<td>0.83</td>
</tr>
<tr>
<td>5 Reliable-Unreliable</td>
<td>0.78</td>
</tr>
<tr>
<td>6 Experienced-Not Experienced</td>
<td>0.72</td>
</tr>
<tr>
<td>7 Expert-Novice</td>
<td>0.73</td>
</tr>
<tr>
<td><strong>Message Evaluation</strong></td>
<td></td>
</tr>
<tr>
<td>1 This message was satisfying.</td>
<td>0.84</td>
</tr>
<tr>
<td>2 This message was useful.</td>
<td>0.88</td>
</tr>
<tr>
<td>3 This message was helpful.</td>
<td>0.83</td>
</tr>
<tr>
<td>4 This message was valuable.</td>
<td>0.80</td>
</tr>
<tr>
<td><strong>Attitude</strong></td>
<td></td>
</tr>
<tr>
<td>1 The MMR vaccine is safe.</td>
<td>0.82</td>
</tr>
<tr>
<td>2 The MMR vaccine is healthy.</td>
<td>0.85</td>
</tr>
<tr>
<td>3 Obtaining the MMR vaccine is a wise decision.</td>
<td>0.80</td>
</tr>
<tr>
<td>4 My attitude toward the MMR vaccine is favorable.</td>
<td>0.78</td>
</tr>
<tr>
<td>5 My attitude toward the MMR vaccine is good.</td>
<td>0.70</td>
</tr>
<tr>
<td>6 My attitude toward the MMR vaccine is positive.</td>
<td>0.66</td>
</tr>
<tr>
<td><strong>Subjective Norms</strong></td>
<td></td>
</tr>
<tr>
<td>1 Parent(s) would want my child vaccinated with the MMR vaccine.</td>
<td>0.86</td>
</tr>
<tr>
<td>2 Spouse would want my child vaccinated with the MMR vaccine.</td>
<td>0.82</td>
</tr>
<tr>
<td>3 Sibling(s) would want my child vaccinated with the MMR vaccine.</td>
<td>0.67</td>
</tr>
<tr>
<td>4 Peers would want my child vaccinated with the MMR vaccine.</td>
<td>0.75</td>
</tr>
<tr>
<td>5 Close friends would want my child vaccinated with the MMR vaccine.</td>
<td>0.75</td>
</tr>
<tr>
<td>6 Parent(s) opinions about the MMR vaccine are important to me.</td>
<td>0.85</td>
</tr>
<tr>
<td>7 Spouse’s opinions about the MMR vaccine is important to me.</td>
<td>0.80</td>
</tr>
<tr>
<td>8 Sibling(s) opinions about the MMR vaccine is important to me.</td>
<td>0.72</td>
</tr>
<tr>
<td>9 Peers opinions about the MMR vaccine are important to me,</td>
<td>0.82</td>
</tr>
<tr>
<td>10 Close friends opinions about the MMR vaccine are important to me.</td>
<td>0.80</td>
</tr>
<tr>
<td><strong>Behavioral Control</strong></td>
<td></td>
</tr>
<tr>
<td>1 I have the ability to get my child vaccinated with the MMR vaccine.</td>
<td>0.80</td>
</tr>
<tr>
<td>2 I see myself as capable of getting the MMR vaccine for my child.</td>
<td>0.76</td>
</tr>
<tr>
<td>3 I am confident I will be able to obtain the MMR vaccine for my child.</td>
<td>0.74</td>
</tr>
<tr>
<td>4 I am sure I will have my child vaccinated with the MMR vaccine.</td>
<td>0.72</td>
</tr>
<tr>
<td>5 I believe the MMR vaccine is affordable.</td>
<td>0.70</td>
</tr>
<tr>
<td><strong>Perceived Severity</strong></td>
<td></td>
</tr>
<tr>
<td>1 The measles are not a serious problem in the USA.</td>
<td>0.65</td>
</tr>
<tr>
<td>2 The mumps are not a serious problem in the USA.</td>
<td>0.68</td>
</tr>
<tr>
<td>3 He or she may become very ill.</td>
<td>0.79</td>
</tr>
<tr>
<td>4 He or she may have to be hospitalized.</td>
<td>0.78</td>
</tr>
<tr>
<td>5 He or she may get very sick with the measles.</td>
<td>0.73</td>
</tr>
<tr>
<td>6 He or she may get very sick with the mumps.</td>
<td>0.76</td>
</tr>
</tbody>
</table>
Table 2.

**Confirmatory Factor Analysis - Part Two**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susceptibility</td>
<td>My child will not catch the mumps.</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>My child will not catch the measles.</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>I increase my child's chances of getting the mumps.</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>I increase my child's chances of getting the measles.</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>Even without the vaccine, my child will not get sick.</td>
<td>0.84</td>
</tr>
<tr>
<td>Costs</td>
<td>Protecting against the measles takes a considerable amount of effort.</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>Protecting against the mumps takes a considerable amount of effort.</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Taking my child to receive the MMR vaccine is difficult.</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Taking my child to receive the MMR vaccine is time consuming.</td>
<td>0.77</td>
</tr>
<tr>
<td>Fear</td>
<td>I am afraid my child will catch the mumps.</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>I am afraid my child will catch the measles.</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>I am fearful my child will catch the measles.</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>I am fearful my child will catch the mumps.</td>
<td>0.59</td>
</tr>
<tr>
<td>Responsibility</td>
<td>My responsibility to have my child vaccinated with the MMR vaccine.</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>I feel an obligation to have my child vaccinated with the MMR vaccine</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>I feel responsible for taking actions against the mumps.</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>It is my duty to have my child vaccinated with the MMR vaccine.</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>Having my child vaccinated can help protect other people from the measles.</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>I feel responsible for taking action against the measles.</td>
<td>0.70</td>
</tr>
<tr>
<td>Behavioral Intent</td>
<td>I plan to have my child vaccinated with the MMR vaccine.</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>I intend on having my child vaccinated with the MMR vaccine.</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>I want to have my child vaccinated with the MMR vaccine.</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>I will have my child vaccinated with the MMR vaccine.</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>I wish to have him/her vaccinated with the MMR vaccine.</td>
<td>0.82</td>
</tr>
<tr>
<td>Seeking</td>
<td>I have previously sought out information about the MMR vaccine.</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>I have paid close attention to information about the MMR vaccine.</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>I have actively searched for facts about the MMR vaccine.</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>I have made an effort to find information about the MMR vaccine.</td>
<td>0.84</td>
</tr>
</tbody>
</table>
Credibility Manipulation

Hypothesis 1 explored whether a celebrity source would be perceived as a less credible source of health information than a medical source. To test this, a 2 x 2 ANOVA was used to assess the influence manipulated credibility and manipulated fear had on perceived credibility. A main effect demonstrated that manipulated credibility caused perceived credibility $F(1, 610) = 97.78$, $p = .00$. Specifically, a significant average difference was found in credibility perceptions among those who had been exposed to the high credibility condition ($M = 4.22$, $SD = 1.25$) versus those individuals who have been exposed to the low credibility condition ($M = 2.78$, $SD = 1.28$). This test also demonstrated that manipulated fear had no influence on perceived credibility.

Fear Manipulation

Hypothesis 10 was tested to determine whether or not a significant difference existed between participants who were randomly assigned to the high fear condition and the low fear condition. To test this, a 2 x 2 ANOVA was used to assess the influence manipulated credibility and manipulated fear had on perceived fear. A main effect demonstrated that manipulated fear influenced perceived fear $F(1, 610) = 5.83$, $p = .02$. Specifically, an average difference was found between participants who were enrolled in the high ($M = 5.10$, $SD = 1.34$) versus low ($M = 4.82$, $SD = 1.59$) fear condition. By contrast, a main effect was not found for manipulated credibility.

Test of the Predicted Model

Prior to testing the predicted model, a correlation matrix was run and the associations among key variables were examined. After this, structural equation modeling was used to test the predicted model (Figure 5). Given that manipulated credibility and manipulated fear were
only significantly associated with the outcomes these variables intended to influence (i.e., source credibility and fear, respectively), all data was analyzed in an aggregate fashion. The manipulations were accounted for within the model. The hypothesized model was a poor fit to the data (CMIN/DF = 4.03, RMSEA = .071, PCLOSE = .00). Given this, modifications were made to the model based on a re-review of the literature and further analyses of the correlation matrix. Model re-specification and trimming resulted in a model which was a good fit to the data (CMIN/DF =3.05, RMSEA=.06, PCLOSE=.16). Path coefficients from the trimmed model can be found in Table 3.
Table 3.
*Path Coefficients for Final Model*

<table>
<thead>
<tr>
<th>Path</th>
<th>rho</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credibility to Message Evaluation</td>
<td>.34**</td>
</tr>
<tr>
<td>Message Evaluation to Subjective Norm</td>
<td>.10*</td>
</tr>
<tr>
<td>Message Evaluation to Perceived Behavioral Control</td>
<td>.12**</td>
</tr>
<tr>
<td>Message Evaluation to Susceptibility</td>
<td>.15**</td>
</tr>
<tr>
<td>Message Evaluation to Severity</td>
<td>.18**</td>
</tr>
<tr>
<td>Message Evaluation to Response Cost</td>
<td>.46**</td>
</tr>
<tr>
<td>Response Efficacy to Message Evaluation</td>
<td>.12**</td>
</tr>
<tr>
<td>Attitude to Message Evaluation</td>
<td>.16**</td>
</tr>
<tr>
<td>Attitude to Vaccination Intent</td>
<td>.13**</td>
</tr>
<tr>
<td>Subjective Norm to Vaccination Intent</td>
<td>.10*</td>
</tr>
<tr>
<td>Perceived Behavioral Control to Vaccination Intent</td>
<td>.13**</td>
</tr>
<tr>
<td>Susceptibility to Vaccination Intent</td>
<td>.18**</td>
</tr>
<tr>
<td>Severity to Vaccination Intent</td>
<td>.11**</td>
</tr>
<tr>
<td>Response Efficacy to Vaccination Intent</td>
<td>.07*</td>
</tr>
<tr>
<td>Response Costs to Vaccination Intent</td>
<td>-.17**</td>
</tr>
<tr>
<td>Susceptibility to Fear</td>
<td>.17**</td>
</tr>
<tr>
<td>Fear to Vaccination Intent</td>
<td>.07*</td>
</tr>
<tr>
<td>Severity to Fear</td>
<td>.36**</td>
</tr>
<tr>
<td>Attitude to Fear</td>
<td>.14**</td>
</tr>
<tr>
<td>Attitude to Personal Responsibility</td>
<td>.27**</td>
</tr>
<tr>
<td>Personal Responsibility to Vaccination Intent</td>
<td>.11**</td>
</tr>
<tr>
<td>Self-Efficacy to Personal Responsibility</td>
<td>.10*</td>
</tr>
<tr>
<td>Severity to Personal Responsibility</td>
<td>.18**</td>
</tr>
<tr>
<td>Gender to Information Seeking</td>
<td>.40**</td>
</tr>
<tr>
<td>Information Seeking to Perceived Behavioral Control</td>
<td>.07*</td>
</tr>
<tr>
<td>Information Seeking to Attitudes</td>
<td>.11**</td>
</tr>
</tbody>
</table>

*Note.** **p < .01; *p < .05
Figure 6. Final Model

Trimmed Model

Credibility.

Answering Research Question 1, perceived source credibility was found to positively predict message evaluation ($\rho = .34$, $p = .00$) upon exposure to the experimental stimulus message.

Message evaluation.

Research Questions 2, 3, and 4, queried whether or not message evaluation would significantly and positively predict attitudes, subjective norms and perceived behavioral control. All three of these questions were answered. Specifically, message evaluation positively subjective norms ($\rho = .10$, $p = .00$) and perceived behavioral control ($\rho = .12$, $p = .00$). By contrast to initial predictions, attitudes were found to predict message evaluation ($\rho = .16$, $p = .00$)
Next, Hypotheses 5, 6, 8 and 9 posed that message evaluation would predict perceived susceptibility to disease, perceived severity of disease, response efficacy and response costs. Most of these hypotheses were supported by the data. First, message evaluation predicted perceived susceptibility to disease ($\rho = 15, p = .00$), perceived severity of disease ($\rho = .18, p = .00$) and response costs ($\rho = .46, p = .00$). However, response efficacy was found to predict message evaluation ($\rho = .12, p = .00$).

**Planned behavior constructs.**

The next hypotheses posed that TPB variables would predict vaccination intent. The predicted paths were supported in the model. Supporting Hypotheses 2, 3, and 4, attitudes ($\rho = .13, p = .00$), subjective norms ($\rho = .10, p = .03$) and perceived behavioral control ($\rho = .19, p = .00$), predicted vaccination intent.

**Protection motivation constructs.**

Moving to the hypotheses that addressed the relationship between relevant protection motivation constructs and behavioral intent (Hypotheses 5, 6, 8, and 9), perceived susceptibility to disease ($\rho = .18, p = .00$) and perceived severity of disease ($\rho = .11, p = .00$) predicted vaccination intent. Response efficacy ($\rho = .07, p = .04$), and response costs ($\rho = -.17, p = .00$) also predicted behavioral intent.

**Fear.**

Moving to Research Question 10, the relationship between perceived susceptibility to disease, fear and vaccination intent was explored. Fear partially mediated the relationship between perceived susceptibility and behavioral intent. Specifically, susceptibility predicted fear ($\rho = .17, p = .00$) and fear predicted vaccination intent ($\rho = .07, p = .05$).
Turning to Research Question 11, a similar conclusion was drawn from the data. Perceived severity of disease partially mediated the relationship between fear and behavioral intent. Perceived severity predicted fear ($\rho = .36, p = .00$) and fear predicted behavioral intent ($\rho = .07, p = .05$).

**Personal responsibility.**

Moving to Research Questions 12, 13, and 14, the relationship between planned behavior constructs and personal responsibility was explored. First, feelings of personal responsibility mediated the relationship between attitudes and vaccination intent. Attitudes predicted feelings of personal responsibility ($\rho = .27, p = .00$) and personal responsibility predicted behavioral intent ($\rho = .11, p = .00$). In addition to this, personal responsibility was found to partially mediate the relationship between self-efficacy and behavioral intent. Specifically, self-efficacy ($\rho = .10, p = .02$) predicted feelings of personal responsibility. However, personal responsibility did not mediate the relationship between subjective norms and behavioral intent.

**Information seeking.**

Finally, the relationships among the information seeking measures were explored. Supporting Hypothesis 11, female gender predicted information seeking ($\rho = .40, p = .00$). Turning to Hypotheses 12, 13 and 14, information seeking and positively predicted perceived behavioral control ($\rho = .07, p = .05$) and attitudes ($\rho = .11, p = .00$). However, a relationship between information seeking and subjective norms was not found.

Upon re-review of the literature and analysis of associations among key constructs, it was determined that two additional paths would be integrated into the model. First, a path was created between attitudes and fear ($\rho = .14, p = .00$). As such, fear partially mediated the relationship between attitudes and behavioral intent. A path was also added between perceived
severity of disease and personal responsibility ($\rho = .18, p = .00$). With this, personal responsibility partially mediated the relationship between severity and behavioral intent.

**Sources utilized.**

Participants reported utilizing a wide variety of information sources to obtain information about the MMR vaccine. Most participants reported using sources such as health professionals (69%), academic journal articles (56%) and government health websites (38%). Participants also used sources such as non-government health websites (36%), online news articles (30%), family members (26%), and friends (23%) for information about the MMR vaccine. Finally, a small (but still substantial) proportion of the population reported seeking out information through online forums (20%) and social networking websites (15%). Even fewer participants reportedly sought out information from radio news (9%) and online blog posts (9%).
Chapter 6
Discussion

The overarching objective of the present investigation was to assess the impact that perceptions of source credibility and fear had on childhood vaccination intentions among parents. Secondary goals were to understand the relationship between message evaluation and social-cognitive constructs; reaffirm the link between social cognitive constructs and vaccination intent; explore the influence of personal responsibility on vaccination intent; and assess behavioral outcomes that may result from information seeking behaviors.

Message Exposure and Evaluation

Within this 2 x 2 design, source credibility and fear were manipulated. Specifically, participants were exposed to a message attributed to a source that could objectively be categorized as a high or low credibility source. The high credibility source was a fictional female pediatrician who identified herself as a mother. The low credibility source was a celebrity who identified herself as a mother as well. The text from all conditions can be found in Appendix A.

The test of Hypothesis 1 demonstrated that perceptions of source credibility were in line with the objective credibility of the source. On average, participants perceived the pediatrician to be a more credible source of information than the actress. Furthermore, it is important to note that a substantial difference existed in perceptions of credibility between the two conditions. While the celebrity source was clearly rated as a source of low credibility ($M = 2.78$, $SD = 1.28$), the physician was a source that was deemed to be of moderate credibility ($M = 4.22$, $SD = 1.25$).

While a disparity existed in credibility perceptions between each of these conditions, credibility ratings of the physician source were still relatively low. In particular, average
credibility ratings of the physician were only slightly above the mid-point of this 7-point scale. The moderate credibility ratings of the pediatrician may be the result of participants’ lack of familiarity with the source. In other words, parents and health consumers may consider their own health professionals to be highly credible sources of information. This may have to do with the pre-established rapport patients have with their current providers. While consumers may still consider unknown health professionals to have some degree of credibility, patients may lend more credence to the expertise of their personal providers than general or unknown physicians.

In spite of these findings, celebrities are consistently used as spokespeople for numerous health initiatives and campaigns (Centers for Disease Control and Prevention, 2013b). Furthermore, evidence has demonstrated that people do trust celebrities “some” for health information (Freed, et al., 2011). Given this, other dimensions of credibility may be coming into play here. Specifically, the present investigation focused on perceptions of source expertise and trustworthiness. However, when it comes to celebrities, other sub-factors of credibility such as dynamism, likability, and attractiveness may be what influences audience perceptions of trust.

An alternative explanation for these findings may be that something other than perceptions of credibility influences consumers’ tendency to trust celebrities as a source of health information. Future work should explore whether factors such as familiarity, social proof, and/or identification influence one’s inclination to yield to health advice given by a celebrity.

As demonstrated in the model, credibility ratings had a direct influence on message evaluation and an in-direct influence on cognitive and behavioral outcome variables. First, a significant and positive relationship was found between perceptions of source credibility and one’s overall evaluation of the message. This relationship signaled that participants were inclined to evaluate the message in a favorable manner if the source of the message was
considered to be credible. Participants were less likely to evaluate the message in a favorable manner if the source was not considered to be credible.

Also of note, perceptions of source credibility indirectly influenced the focal behavioral outcome, vaccination intent. This relationship was mediated by message evaluation, protection motivation and planned behavior constructs. Given that perceptions of credibility appear to directly influence message evaluation and indirectly influence vaccination intent, it is imperative for future campaign initiatives to disseminate relevant health messages via credible sources.

As previously noted, the relationship between message exposure, perceptions of credibility, and message evaluation was consistent with results from previous work. When exploring the data in an aggregate fashion, perceived source credibility significantly predicted respondents’ evaluations of information disseminated in the stimulus message.

The present study was among the first to establish a clear relationship between message evaluation and social-cognitive outcome variables. In contrast to previous work that has primarily assumed the effectiveness of a message via its’ direct impact on outcomes such as attitudes, cognitions, and perceptions, this study included a message evaluation measure to determine whether or not evaluation mediated the relationship between message exposure and outcomes of focus.

These findings demonstrated that one’s perceived usefulness of a relevant health message significantly predicted subjective norms, perceived behavioral control, perceived severity of disease, perceived susceptibility of disease, and response costs. By contrast to the initial predictions, attitudes and response efficacy significantly predicted message evaluation. Future investigations, especially related campaign initiatives, should pre-test campaign materials and
messages to ensure that members of the target audience considered messages to be useful and accurate.

**Planned Behavior**

Paralleling previous meta-analytic investigations, attitudes, subjective norms, and perceived behavior control were all found to be significant predictors of vaccination intent. Thus, more favorable attitudes toward the MMR vaccine, perceived social pressure to have one’s child vaccinated, and one’s perceived ability to engage in this behavior significantly predicted whether an individual intended to have his or her child vaccinated.

While previous work in general health and vaccination domains have clearly established these linkages, this investigation was one of the first to explore planned behavior constructs in reference to MMR vaccination decisions. This particular topic is novel because MMR vaccination decisions are surrogate decisions made by parents and guardians of young children. When compared to existing literature, it appears as though the surrogate and personal vaccination decision-making process functions in a similar manner.

Moving to the practical implications of these findings, future campaign and/or intervention efforts should focus on influencing parents’ attitudes, subjective norms, and perceived behavioral control in reference to the MMR vaccine. In particular, these initiatives should disseminate messages that present the MMR vaccine in a favorable light and focus on strategies and/or tactics that would make obtaining the vaccine easier for parents.

Given the key role of subjective norms in vaccination decisions, public health professionals should design campaigns to capitalize on the influence that social pressure can have on vaccination decision-making. Specifically, these initiatives can target friends, peers, and family members of people with young children. The campaign efforts can encourage these
individuals to remind their salient referents with young children about the importance of adhering to the U.S. childhood vaccination schedule.

**Protection Motivation**

Moving toward the second framework of focus, perceived susceptibility to disease, perceived severity of disease, response efficacy, and response costs were all found to be significant predictors of vaccination intent. Therefore, stronger feelings of vulnerability to the measles and/or mumps, stronger beliefs about the implications of these diseases, stronger feelings about the effectiveness of the MMR vaccine in preventing disease, and lower perceived costs in obtaining the vaccination were all significantly associated with intentions to vaccinate.

Paralleling the results of the planned behavior variables, these findings further substantiated existing protective motivation research. These findings demonstrated that the relationship between these constructs was similar for personal and surrogate vaccination decisions.

From a practical standpoint, these findings provide useful insight for campaign and/or intervention design. Specifically, campaign and intervention messages must clearly focus on the potential severity of the measles and mumps. These initiatives should inform individuals of how susceptible their child will be to disease if they do not obtain the full round of MMR vaccinations. In addition to this, messages should focus on the effectiveness of the vaccine in preventing the measles and mumps, while stressing that the costs of obtaining the vaccine are quite minimal.

The present investigation was innovative in the sense that it integrated two theoretical frameworks that have not typically been explored in tandem. This was one of the first endeavors to integrate the protection motivation theory and theory of planned behavior variables to model
the impact that susceptibility, severity, attitudes, subjective norms, response efficacy, self-efficacy and response costs have on intentions to engage in a health behavior. The results demonstrate the independent impact that each of these variables had on current (or future) parents’ vaccination intentions. This investigation contrasts from existing endeavors which assess these models independently (Kim et al., 2012; Beirens et al., 2008) to determine the influence social cognitive constructs have in health behavior decision making.

Given that social-cognitive variables from both theories appear to influence health-decision making, it is important for future work to design intervention efforts around all of these constructs. When relevant, campaign initiatives should create messages that address all of the previously described social cognitive constructs. When text or space is limited, campaigns can target a few of the most important variables. The relative degree of influence that each of these variables has on health behavior intent may depend on the particular health issue of focus.

The second manipulated variable in the stimulus message was fear of the measles and mumps. Fear was manipulated through the modification of outcomes associated with the diseases that the MMR vaccine is designed to protect against. Specifically, respondents in the high fear condition were informed that the measles and mumps could result in potentially frightening outcomes, such as pneumonia, brain inflammation, and death. This condition also included a photo of a child suffering from a bad case of the measles with red blotches all over his body. By contrast, respondents in the low fear condition were informed that the measles and mumps could have less frightening impacts on health such as ear infections and diarrhea. The message in this condition included a photo of a seemingly healthy child. Exemplars of these messages can be found in Appendix A.
Results from an independent samples t-test demonstrated that the fear manipulation was effective in modifying participants’ levels of fear associated with the measles and mumps. While a significant difference was found between the conditions, parents in both conditions reported a surprisingly high level of fear associated with the measles and mumps. These high levels of fear may have been a result of the general frightening nature of childhood diseases, or the fact that both of the experimental manipulations induced fear (to some degree).

The present investigation adds to existing literature by re-integrating fear into practical applications of PMT and re-conceptualizing the role that this variable may play in the trajectory of the theory. While fear was a key component in the first two conceptualizations of protection motivation theory, this variable has been largely ignored in practical applications of this framework (Gainforth, Cao, Latimer-Cheung, 2012; McMath & Prentice-Dunn, 2005). In contrast to extant research, the present study included fear as a measured variable.

In addition to the integration of fear, this work diverged from the analytic approach taken to conceptualize the role fear plays in health decision-making. The few investigations that include fear as a measured variable conceptualize it (a) as amplifier of perceived susceptibility and perceived severity, or (b) as an independent predictor of behavioral intent. Diverging from this path, the present work found that fear partially mediated the relationship between susceptibility, severity, and behavioral intent.

The paths in the model suggest that one method of influencing vaccination intent among parents is to increase an individuals’ level of fear. The paths leading to fear demonstrate that this can be done by amplifying perceptions of perceived susceptibility to disease and perceived severity of disease. Given this, it would be useful for future campaign and intervention
initiatives to invoke greater perceptions of fear by stressing one’s susceptibility to the mumps (without the vaccine) and severity of the mumps.

Turning to another relevant construct, personal responsibility was found to mediate the relationship between self-efficacy and behavioral intent. These results take the findings of the pilot study one-step further in that these results proposed directionality among these constructs. Specifically, personal responsibility mediated the relationship between self-efficacy and vaccination intent.

These results could be explained in a couple of different ways. In other words, an individual must feel as though his or her personal (or family’s) needs are fulfilled prior to feeling personal obligation to help others. Therefore, an individual who has already obtained the resources required to vaccinate his or her child would be more inclined to consider what is best for community health, than those who do not currently have the ability to fulfill their personal (or their family’s) needs.

Another potential explanation is that people who are unable to receive the vaccine may engage in avoidance behavior as a coping mechanism. To clarify, an individual who does not believe that he or she has the resources required to obtain the vaccination for his or her child may engage in avoidance behaviors. To alleviate his or her worry or concern, this person may actively avoid thinking about the diseases that his or her child (and the rest of the community) may be more vulnerable to as a result of his or her child’s non-vaccinated status.

From a practical standpoint, future campaign and/or intervention initiatives should design messages to make parents feel more efficacious about their ability to obtain the vaccine for their child. Additionally, these initiatives must focus on disseminating information about how vaccination choices for their children could influence the community as a whole. This message
could emphasize the key role that strength in numbers play when it comes to protecting children against highly preventable diseases such as the measles and mumps.

**Information Seeking**

Moving onto information seeking habits, the hypothesized relationship between gender and information seeking was supported. Specifically, female gender significantly and positively predicted information seeking about the MMR vaccine. These findings parallel previous research which has established that females are more inclined to seek out information on a wide variety of health issues including cancer and chronic illness (Carpenter et al., 2011; Rutten, Squires & Hesse, 2006).

These findings may be the result of the fact that females often feel more susceptible to risks and are sometimes found to be more inclined to engage in risk protective actions. Based on this information, it may be useful for credible sources of health information to target and tailor their vaccination materials to young women and mothers.

Respondents reported utilizing numerous sources to obtain information about the MMR vaccine. More participants sought information from a health professional than any other source. This result mirrored several other information seeking investigations. For instance, the present findings are similar those of Carpenter and others (2011) in which it was reported that among a sample of patients with rare illnesses, patients reported using physicians as sources of information most often within the previous year.

Participants also reported relying heavily on other interpersonal sources. About a quarter of the sample reportedly sought out information from family members and friends. As such, it is important to educate the general public about these issues, not just parents of young children.
This way, important referents’ in the lives of new parents will be able to provide accurate and useful information when needed.

Participants’ inclination to seek out information about the MMR vaccine from academic journal articles was in stark contrast to the results of previous research. Within this investigation 52% of participants indicated that they had previously sought out information about the MMR vaccine from an academic journal article. These unique findings are probably partially due to the highly educated nature of this sample. Future research should assess whether participants had the knowledge and skills necessary to accurately interpret the information disseminated through these academic sources.

**Information Seeking and Planned Behavior**

Moving back to the structural model, the results demonstrated that information seeking significantly predicted two planned behavior variables, attitudes and self-efficacy. Thus, attitudes and self-efficacy were found to mediate the relationship between MMR information seeking behavior and vaccination intent among parents. The present investigation served to extend existing literature by modeling the conceptual processes which mediate the relationship between information seeking habits and behavioral intentions.

These findings demonstrate that information seeking may have an indirect influence on behavioral intent. Given this, online and offline health information sources should strive to provide the clear instructions and information about the importance of childhood vaccines and where/when they can be obtained.

**Limitations and Future Research**

While the present study provided useful insight into the numerous variables that influence vaccination intentions, some limitations must be acknowledged. First, the findings of this study
may not be generalizable to certain health issues. Childhood vaccinations are a health behavior that parents have a considerable amount of control over. Given that parents may have less control over childrens’ health behaviors as they grow older, this model may only be relevant for health issues of young children.

Future research should explore whether or not this model replicates in various contexts. First, additional investigations should be completed to determine whether or not this model would replicate in additional childhood vaccination contexts. Second, research needs to be completed to determine whether or not this model would replicate in additional situations relevant to the health of young children. This may include issues such as nutrition and/or breastfeeding. Finally, more work needs to be undertaken to find out if this model would be effective in explaining the cognitive processes associated with a wide variety of behaviors pertaining to the health of children and adults.

A second major limitation of the study was the sample used. A convenience sample was recruited for this study through various listservs and social-networking websites. As a result, the sample was relatively homogenous and not representative of the general U.S. population on many key factors, such as income, ethnicity, and highest level of education acquired. This homogenous subsample likely influenced the types of sources that information seekers were using and parents’ ability to have their child vaccinated. Specifically, highly educated participants probably had an easier time seeking out credible online information sources. Additionally, these individuals likely had more of the resources necessary (e.g., time, reliable transportation, etc.) to acquire the MMR vaccine for their child.

In order to gain an understanding of how the previously articulated variables generalize to the broader population, a more ethnically diverse sample with more heterogeneity in income
levels must be collected. Future replications of this effort should recruit a nationally representative sample.

A third major limitation of the present study was the behavioral measure. Although the present investigation assessed parents’ intentions to have their child vaccinated with the MMR vaccine, behaviors were not assessed. Existing research would benefit from the acquisition of longitudinal data in which parents are asked about their intention to receive the MMR vaccine prior to the age in which their child is supposed to obtain the first round of the vaccine. After this point, researchers could follow up with parents to determine whether or not the vaccine was obtained.

An additional factor that limited the present work was the manner in which fear was measured. Paralleling previous work (Smerecnik, Quaak, van Schayck, van Schooten, & de Vries, 2011), fear was measured through a battery of questions which served as a proxy measure of how frightened a particular individual is at the prospect of his or her child coming down with the measles and mumps. While a self-report proxy measure is a step in the right direction, critics have noted that self-report may not be an adequate manner in which various emotions (including fear) should be measured. As such, future research would benefit from the utilization of multiple means of measurement (e.g., self-report & physiological) as a proxy measure of particular emotions.

Despite these limitations, the present study contributed to current knowledge regarding vaccination perceptions and MMR vaccination intentions of parents with young children. In particular, this study identified a structural model in which risk perceptions, perceptions of personal responsibility and self-efficacy mediated the relationship between vaccination knowledge and vaccination intentions. The identification of the previously specified model
highlights the key role that theoretical integration can have in furthering the scope and explanatory ability of existing health behavior models.


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Footnotes

1 The sample was tested to determine whether participants that who did have and did not have children differed significantly on focal constructs. Participants who had children only scored significantly higher on demographic variables such as age and income. These individuals were also less likely to have health insurance. Given that these variables did not correlate with information seeking, planned behavior, or protection motivation variables, they did not need to be accounted for within the model.

2 The lack of differences found between vaccination status and focal variables may have been because many parents intended to seek out the vaccine in the future, but were unable to do so already because of the age of their child.

3 Two items that were initially intended to measure fear were removed from the analyses because of low primary factor loadings ($<.60$). These items were “I am concerned that my child will get the measles” and “I am concerned that my child will get the mumps.”

4 The maladaptive response rewards variable failed to correlate with any of the focal constructs within the study. This may have been a function of the novelty of (and lack of pre-testing of) the measure. Given this, the maladaptive response rewards variable was removed from the trimmed model.
Appendix A

Stimulus 1: High Credibility/High Fear Condition

My name is Marsha Harris. I’ve been a pediatrician for over 20 years now. My biggest role by far, however, has been that of “mom” to my three children. I learned that measles, mumps and rubella can be very serious diseases and can cause complications such as pneumonia, brain inflammation, mental retardation, meningitis and even death.

The MMR vaccine....

Don’t gamble with your child’s health.
Get your child vaccinated.
I did.

Stimulus 2: Low Credibility/High Fear Condition

My name is Reese Witherspoon. I’ve been an actress in Hollywood for over 20 years now. My biggest role by far, however, has been that of “mom” to my three children. I learned that measles, mumps and rubella can be very serious diseases and can cause complications such as pneumonia, brain inflammation, mental retardation, meningitis and even death.

The MMR vaccine....

Don’t gamble with your child’s health.
Get your child vaccinated.
I did.
Stimulus 3: Low Credibility/Low Fear Condition

My name is Reese Witherspoon. I’ve been an actress in Hollywood for over 20 years now. My biggest role by far, however, has been that of “mom” to my three children. I learned that measles, mumps and rubella can cause painful complications such as ear infections and diarrhea.

The MMR vaccine......

Get your child vaccinated.
I did.

Stimulus 4: High Credibility/Low Fear Condition

My name is Marsha Harris. I’ve been a pediatrician for over 20 years now. My biggest role by far, however, has been that of “mom” to my three children. I learned that measles, mumps and rubella can cause painful complications such as ear infections and diarrhea.

The MMR vaccine......

Get your child vaccinated.
I did.
Source Credibility Items:
Trustworthy _ _ _ _ _ _ _ Not Trustworthy
Believable _ _ _ _ _ _ _ Not Believable
Credible _ _ _ _ _ _ _ Not Credible
Knowledgeable _ _ _ _ _ _ _ Not Knowledgeable
Reliable _ _ _ _ _ _ _ Unreliable
Experienced _ _ _ _ _ _ _ Not Experienced
Expert _ _ _ _ _ _ _ Novice

Message Evaluation Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
This message was satisfying.
This message was useful.
This message was helpful.
This message was valuable.

Attitude Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
The MMR vaccine is safe.
The MMR vaccine is healthy.
Obtaining the MMR vaccine is a wise decision.
My attitude toward the MMR vaccine is favorable.
My attitude toward the MMR vaccine is good.
My attitude toward the MMR vaccine is positive.

Subjective Norms Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
My parent(s) would want my child vaccinated with the MMR vaccine.
My spouse would want my child vaccinated with the MMR vaccine.
My sibling(s) would want my child vaccinated with the MMR vaccine.
Peers would want my child vaccinated with the MMR vaccine.
Close friends would want my child vaccinated with the MMR vaccine.
Parent(s) opinions about the MMR vaccine are important to me.
Spouse’s opinions about the MMR vaccine is important to me.
Sibling(s) opinions about the MMR vaccine is important to me.
Peers opinions about the MMR vaccine are important to me.
Close friends opinions about the MMR vaccine are important to me.

Perceived Behavioral Control Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
I have the ability to get my child vaccinated with the MMR vaccine.
I see myself as capable of getting the MMR vaccine for my child.
I am confident I will be able to obtain the MMR vaccine for my child.
If it were entirely up to me, I am sure I would have my child vaccinated with the MMR vaccine.
I believe the MMR vaccine is affordable.
Perceived Severity Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
The measles are not a serious problem in the USA.
The mumps are not a serious problem in the USA.
If my child does not receive the MMR vaccine, he or she may become very ill.
If my child does not receive the MMR vaccine, he or she may have to be hospitalized.
If my child does not receive the MMR vaccine, he or she may get very sick with the measles.
If my child does not receive the MMR vaccine, he or she may get very sick with the mumps.

Perceived Susceptibility Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
My child will not catch the mumps.
My child will not catch the measles.
I will increase my child’s chances of getting the mumps if I do not seek out the MMR vaccine.
I will increase my child’s chances of getting the measles if I do not seek out the MMR vaccine.
Even without the vaccine, my child will not get sick.

Response Efficacy Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
The MMR vaccine is effective in preventing the measles.
The MMR vaccine is effective in preventing the mumps.
The MMR vaccine is the best way to prevent the measles.
The MMR vaccine works to prevent the mumps in children.
The MMR vaccine works to prevent the measles in children.

Maladaptive Response Rewards Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
If I do not have my child vaccinated with the MMR vaccine, I will not have to worry about him/her having autism.
If I do not have my child vaccinated with the MMR vaccine, I will not have to worry about him/her having a learning disability.
If I do not obtain the MMR vaccine for my child, I will not have to worry about the safety of the vaccine.
If I do not have my child vaccinated with the MMR vaccine, I will not have to worry about him/her having too many vaccinations at once.
If I do not obtain the MMR vaccine for my child, I will not have to spend money on the vaccine.

Response Costs Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
Protecting my child against the measles takes a considerable amount of effort.
Protecting my child against the mumps takes a considerable amount of effort.
Taking my child to receive the MMR vaccine is difficult.
Taking my child to receive the MMR vaccine is time consuming.

Fear Items:
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
I am afraid that my child will catch the mumps.
I am afraid that my child will catch the measles.
I am fearful that my child will catch the mumps.
I am fearful that my child will catch the measles.

**Personal Responsibility Items:**
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
I believe it is my personal responsibility to have my child vaccinated with the MMR vaccine.
I feel an obligation to have my child vaccinated with the MMR vaccine.
I feel responsible for taking actions against the mumps.
It is my duty to have my child vaccinated with the MMR vaccine.
Having my child vaccinated can help protect other people from the measles.
I feel responsible for taking action against the measles.

**Behavioral Intent Items:**
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
I plan to have my child vaccinated with the MMR vaccine in the near future.
I intend on having my child vaccinated with the MMR in the near future.
I want to have my child vaccinated with the MMR vaccine soon.
I will have my child vaccinated with the MMR vaccine soon.
When my child is eligible, I wish to have s/he vaccinated with the MMR vaccine.

**Information Seeking Behavior Items:**
Items measured along a 1-7 scale ranging from (1) strongly disagree to (7) strongly agree.
I have previously sought out information about the MMR vaccine.
I have paid close attention to information about the MMR vaccine.
I have made an effort to find information about the MMR vaccine.
I have actively searched for facts about the MMR vaccine.

**Information Source Utilization Items:**
Have you previously sought out information on the MMR vaccine from the following sources?
(a) health professional
(b) friend(s)
(c) family member(s),
(d) government health website(s)
(e) non-government health website(s),
(f) online blog post(s),
(g) online forum(s),
(h) print news article(s),
(i) print magazine article(s),
(j) online news article(s),
(k) online magazine article(s),
(l) radio news,
(m) televised news
(n) academic journal article(s)
(o) online social network(s).
Demographic Items:

1. I am a
   a. Male
   b. Female

2. My Ethnicity is
   a. White
   b. Black
   c. Latino
   d. Asian
   e. Other

3. I have ________ children

4. I have ________ children that have not received the MMR vaccine.

5. My youngest child is _____ months old.

6. My youngest child is:
   a. Male
   b. Female

7. Does your youngest child have a medical condition (e.g., allergies) which exempts them from receiving the MMR vaccine:
   a. Yes
   b. No

8. Do you (or your spouse, if applicable) currently have a health insurance policy which covers your health care?
   a. Yes
   b. Not

9. Do you (or your spouse, if applicable) currently have a health insurance policy which covers the health care of your youngest child?
   a. Yes
   b. No

10. Does your youngest child currently receive medical benefits through Medicaid?
    a. Yes
    b. No

11. My marital status is
    a. Single
    b. Married
c. Divorced
d. Widowed
e. Other

12. What is your highest level of education achieved?
a. Some high school
b. High school diploma
c. Some college
d. Bachelor’s Degree
e. Master’s Degree
f. Doctoral Degree
g. Professional Degree

13. My annual household income is
   a. Below $30,000
   b. $30,001-$50,000
   c. $50,001-$70,000
   d. $70,001-$90,000
   e. Above $90,001

14. My age is _________