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A Message-Centered Approach to Understanding Young Women's Decision-making about HPV Vaccination

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Young Women's Decision-making about HPV Vaccination

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DISSERTATION

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A dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy in the College of Communication and Information at the University
of Kentucky

By

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ABSTRACT OF DISSERTATION

A MESSAGE-CENTERED APPROACH TO UNDERSTANDING
YOUNG WOMEN'S DECISION-MAKING ABOUT HPV VACCINATION

The HPV vaccine represents an important step in the primary prevention of cervical cancer, yet uptake rates for the vaccine remain below what is needed to establish "herd immunity" from the virus. While many studies have examined both psychosocial and communication factors affecting HPV vaccination decisions, this study adopts a unique approach to understand the communication environment within which this health decision happens, such as the many and sometimes conflicting messages about vaccine efficacy and safety guiding young women's decisions. Using the message convergence framework, this project identifies how further study of converging and diverging messages in the communication environment in which young women make their vaccination decision can extend research in considering optimal communication strategies to enhance demand for HPV vaccination. In Study 1, 39 unvaccinated women participated in qualitative interviews and were asked questions in order to understand the important elements of the HPV vaccination communication environment that affected their decision (i.e., common sources and content of messages, how they discussed these messages "interacting" and influencing their decision). Study 2 builds on the findings of Study 1 by employing an experimental design to test different message convergence conditions on women's intent to vaccinate (e.g., what happens when a doctor and a family member give conflicting information and recommendations about HPV vaccination?). Three hundred and nine unvaccinated women were randomly assigned to one of nine experimental message conditions and then assessed on behavioral intentions. Support was found for the message convergence framework. This project represents the first formal testing of the message convergence framework and the first time it has been used in the health context. The findings from these studies are discussed in terms of the implications for future cervical cancer research and prevention campaigns, as well as the utility of the message convergence framework for other health communication research topics in which researchers are seeking to better understand and consider the communication environment when designing health behavior interventions.

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08-01-2013
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YOUNG WOMEN'S DECISION-MAKING ABOUT HPV VACCINATION

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DEDICATION

This dissertation is dedicated to my Granddaddy, who never failed to ask me about my academic work and never failed to find it important. Thank you for loving and believing in me.

ACKNOWLEDGEMENTS

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CHAPTER 1

HPV Vaccination

Called one of the "purest examples" of a national public health success story by those in the public health sector, the introduction of the Pap test for the screening and early detection of precancerous cells on the cervix has been responsible for a steady decrease in cervical cancer deaths over the last 50 years (Edwards et al., 2005; Rust, Satcher, Fryer, Levine, & Blumenthal, 2010). However, women remain vulnerable to cervical cancer. In 2008, the most recent year for which national data are available, 12,410 women were diagnosed with cervical cancer and 4,008 women died from the disease (U.S. Cancer Statistics Working Group, 2012). In Kentucky, the cervical cancer incidence rate (8.83 per 100,000 females; 95% CI; Kentucky Cancer Registry, 2012) is significantly higher than the U.S. rate (7.9 per 100,000 females; 95% CI; U.S. Cancer Statistics Working Group, 2012), with 28 out of the 120 counties in Kentucky reporting cervical cancer incidence rates higher than 12.0

With recent research revealing that 75% of cervical cancer diagnoses can be attributed to persistent infections of Human Papillomavirus (HPV) Types 16 and 18 (NCI, 2008), the introduction of the HPV vaccine as the first primary prevention measure against cervical cancer should *also* be a national public health success story. Unfortunately, that is not the case – yet. Two HPV vaccines are available in the United States; both protect against HPV Types 16 and 18, and both are given as three injections over a six-month period (CDC, 2010b). The U.S. Food and Drug Administration (FDA) approved the quadrivalent HPV vaccine Gardasil (Merck) in 2006 for females ages 9-26 years. In 2009, the FDA approved the bivalent HPV vaccine Cervarix

(GlaxoSmithKline) for females ages 10-25 years (CDC, 2010b).   Gardasil is also

approved for males ages 9-26 years because it provides protection against HPV Types 6

and 11, which cause approximately 90% of genital warts, a condition that affects both

males and females (CDC, 2010c). Awareness of the vaccine is high in the United States,

with one report showing more than 78% awareness among young adult women four years

ago (Jain et al., 2009).

Despite strong recommendations from the CDC that girls should be vaccinated at

11 or 12 years old, uptake rates (dose 1) remain low in the United States (CDC, 2010d).

Only 53.0% of adolescents aged 13 to 17 years have received dose 1 of the vaccine

(CDC, 2011). Compared to the nation, Kentucky has even lower uptake rates, with

31.0% of adolescents aged 13 to 17 years having received dose 1 (CDC, 2010a).

National rates are also low for adult women aged 19 to 26 years, who are thought of as a

"catch-up group"; only 20.7% of women in this age group have received dose 1 of the

HPV vaccine (CDC, 2012).

The three-dose schedule of the vaccine presents an additional challenge, with

adherence rates (completion of doses 2 and 3 within the appropriate time frame of sixth

months) lower than dose 1 acceptance rates. Nationally, 34.8% of adolescents aged 13

to 17 years have received doses 2 and 3 of the vaccine (CDC, 2011). In Kentucky, 19.5%

of adolescents aged 13 to 17 years have received doses 2 and 3 (CDC, 2010a). And

while no national data on adult women are currently available, it is reasonable to assume

that adherence rates are low for this group.

Even with these relatively low uptake and adherence rates since the introduction

of the first HPV vaccine in 2006, HPV incidence rates are dropping. A recent study

compared HPV prevalence data from the pre-vaccine era (2003-2006) to the post-vaccine era (2007-2010) and found that for some age groups, the types of HPV that are prevented from this vaccine are decreasing in incidence (Markowitz et al., 2013). Specifically, for females aged 14-19 years, HPV types 6, 11, 16, and 18 (all the types included in the quadrivalent HPV vaccine, Gardasil) decreased by more than half from the pre-vaccination era to the post-vaccination era. This suggests that the HPV vaccine has been especially successful at protecting younger girls and teenagers from this disease. However, there was no decrease in the prevalence of these types of HPV among any other age group. There are two possible reasons for this finding. First, many people in the older age groups (up to age 59) have never been age-eligible for the HPV vaccine. Second, sexual activity is higher among older adolescents and young adult women than the younger age group, and therefore likelihood to contract this disease is higher. Therefore, despite these promising findings, I argue that it's even more important that we focus on this "catch-up" group of young adult women (18-26 years old) who are still age-eligible for the HPV vaccine and for whom we are not seeing a drop in HPV infections in the post-vaccination era. In addition, in the Appalachian region, which includes parts of Kentucky, Lengerich et al. (2005) suggest that the higher cervical cancer incidence rates are due in part to "elevated prevalence of high-risk human papillomavirus" (p. 45). In sum, efforts to understand the HPV vaccination behaviors of young adult women, particularly those in Kentucky, require more attention.

Research reveals a number of factors that help to explain low uptake and adherence rates for the HPV vaccine among young adult women who are making the decision to vaccinate on their own (compared to younger adolescents who may have the

decision made for them by a parent). Researchers have studied young women's knowledge about HPV and cervical cancer and the decision to vaccinate (Cooper, Polonec, & Gelb, 2011; Gerend & Shepherd, 2011; Kennedy, Osgood, Rosenbloom, Feinglass, & Simon, 2011; Klug, Hukelmann, & Blettner, 2008); not surprisingly, poor knowledge about HPV (e.g., what it is, how it causes cervical cancer, how easily it is spread, etc.) was shown to be a barrier to vaccine uptake (Dillard & Spear, 2010; Licht et al., 2010). Previous work has also focused on attitudes, facilitators, and barriers to vaccination (Conroy et al., 2009; Crosby, Schoenberg, Hopenhayn, Moore, & Melhan, 2007; Daley et al., 2010; Dillard & Spear, 2010; Jain et al., 2009; Mills, Vanderpool, & Crosby, 2011a; Patel et al., 2012; Sandfort & Pleasant, 2009; Short et al., 2010). Consistent with social cognition models like the Theory of Reasoned Action (Fishbein & Ajzen, 1975; Montaño & Kasprzyk, 2008), negative attitude about the vaccine was associated with lower vaccination or vaccination intention (Daley et al., 2010; Short et al., 2010) and positive injunctive norms were related to vaccination intention (Dillard & Spear, 2010; Patel et al., 2012). Some of this previous research conflicts, and it remains unclear whether a previous positive Pap test result (suggesting an increased risk for HPV) is more (Crosby et al., 2007) or less likely (Conroy et al., 2009) to motivate young adult women to vaccinate. Previous research also establishes demographic differences in vaccine uptake and adherence among this population age group, such as race/ethnicity (Bednarczyk, Birkhead, Morse, Doleyres, & McNutt, 2011; Dempsey, Cohn, Dalton, & Ruffin, 2011; Kessels et al., 2012), education and socioeconomic status (Jain et al., 2009; Tiro et al., 2012), and geography (Crosby, Casey, Vanderpool, Collins, & Moore, 2011;

Franceschi, 2010).   For example, Crosby, et al. (2011) found that rural women were less likely to get vaccinated that their urban counterparts in Kentucky.

Health communication scholars have also tackled this problem on different levels of analysis. Some scholars have focused on interpersonal sources of influence on vaccination decisions, such as the conversations about HPV vaccination with healthcare providers (Cermak, Cottrell, & Murnan, 2010; Roberto, Krieger, Katz, Goei, & Jain, 2011), with family members such as mothers (Shafer, Cates, Diehl, & Hartmann, 2011), and with female friends (Miller-Ott & Durham, 2011). Others have focused on media sources of information about HPV vaccination and cervical cancer prevention (Briones, Nan, Madden, & Waks, 2012; Correa & Harp, 2011; Forster, Wardle, Stephenson, & Waller, 2010; Grantham, Ahern, & Connolly-Ahern, 2011; Quintero Johnson, Sionean, & Scott, 2011; St. John, Pitts, & Tufts, 2010). Alternatively, some have used communication theory and message design strategies to conduct formative research for and to evaluate pro-HPV vaccination messages through both lab and field experiments (Cohen & Head, 2013; Cohen et al., under contract; Kelly, Leader, Mittermaier, Hornik, & Cappella, 2009; Krawczyk et al., 2012; Nan, 2012a, 2012b; Ngondo, 2009; Shafer et al., 2011; St. Germaine-Madison, 2009; Vanderpool et al., 2013).

The vast amount of past research on this topic reveals many important factors that influence a young woman's decision to receive the HPV vaccine, and many of these findings have been incorporated into public health campaigns to increase vaccination. But given the relatively low uptake and adherence rates in the United States, researchers may be missing an important avenue for studying this health behavior. No previous research has examined the communication *environment* in which HPV vaccines are

introduced to and discussed by audiences. An approach to understanding the number of HPV vaccine messages a young woman is exposed to, the way she processes those messages, and the effect that has on her decision to vaccinate can enhance our understanding of HPV vaccination behaviors.

This approach may be especially prudent given the context of the vaccine's introduction in the United States. First, in the United States the two HPV vaccines were approved and recommended for use in different populations (i.e., different age groups, males and females) in stages over a few years (CDC, 2010b, 2010c). Second, given the seemingly rapid approval of these HPV vaccines in the eyes of the public, many individuals had questions about the safety and efficacy of this prophylactic despite clinical trials that showed high efficacy and low rates of adverse events associated with vaccination (Castellsague et al., 2011; Freed, Clark, Butchart, Singer, & Davis, 2010; Gerhardus & Razum, 2010; Haupt & Sings, 2011). Third, given that HPV is a sexually transmitted disease, a decidedly political and at times religious public discourse developed about the HPV vaccination, especially in light of the recommendation that girls should be vaccinated as early as nine years old (Casper & Carpenter, 2008; Gostin, 2011).

The history of HPV vaccination in the United States leads to a communication environment in which there are "multiple messages that compete for acceptance" that originate from a variety of sources (Sellnow, Ulmer, Seeger, & Littlefield, 2009, p. 7). As previously stated, past studies have examined both psychosocial and communication factors affecting HPV vaccination decisions, but no work has attempted to understand the larger communication environment within which this health decision occurs. This

environment includes messages originating from different *sources*, like friends, family members, social media, mass media, political figures, and healthcare providers. Additionally, the *content* of these messages varies. Messages may be positive and encourage vaccination, negative and discourage vaccination, or ambiguous and cause uncertainty. This variable communication environment around HPV vaccination, combined with the low uptake and adherence rates for young adult women, is ripe for study from a message convergence theoretical perspective, which takes into account how these messages interact for young women, how they process these multiple messages, and the effect these messages have on their vaccination decisions.

Project Overview

To address these concerns, the overarching purpose of this research project is to employ the message convergence framework (MCF; Sellnow et al., 2009) as a lens to understand the communication environment around HPV vaccination and the effect this communication environment has on HPV vaccination decisions for young adult women.

Chapter 2 presents the message convergence framework, a model that outlines how messages and message sources work together in a communication environment, as an alternative approach to past health behavior change research traditions.   Rather than focusing on psychological predictors (e.g., attitudes, beliefs) or individual communication predictors (e.g., a message from a friend), both of which have been address in a plethora of previous research, the MCF considers how multiple communication predictors may influence behavior. Additionally, exemplification theory offers a complementary theory to the MCF in that it enhances an understanding of how multiple messages are processed. After reviewing how these two theories can help

researchers better understand communication about HPV vaccination, the chapter concludes with two research questions that guide Study 1 of this project.

Chapter 3 addresses the first study in this research project. Study 1 serves as formative research for this project since this is the first time the MCF is being used in health behavior research. Thirty-nine unvaccinated women participated in semi-structured interviews about their decision not to vaccinate; women were asked to discuss past conversations and sources of information about HPV vaccination that influenced their decision. The study applies the MCF as a sensitizing framework for analyzing the transcripts from these interviews, and the findings from Study 1 provide the foundation for understanding what the HPV vaccination communication environment looks like for young adult women. Participants identified major sources of information, the typical messages received from those sources, and finally, participants discussed how those messages and message sources interacted to affect their perceptions of the HPV vaccine and their decision to vaccinate. The chapter concludes with a discussion of the findings and limitations of Study 1.

Chapter 4 details the implications from Study 1 findings and tackles the "next step" of addressing *how* young women process multiple messages about HPV vaccination, especially in situations in which messages converge (i.e., agree), diverge (i.e., disagree), or have mixed convergence/divergence characteristics (i.e., some parts of the message agree and some parts disagree). While young women were able to voice how this message interaction occurred through the recall interview technique used in Study 1, this idea of message interaction (or, convergence) in line with the MCF has never been empirically tested. To inform an empirical test of MCF, Study 2 borrows

several tenets from dual-process models of message processing, especially the notion of central and peripheral processing. In an environment of multiple messages, it would be impossible and improbable for an individual to exert the necessary cognitive effort to centrally process all messages. Therefore, Study 2 aims to discover what message and source cues young adult women use when encountering persuasive HPV vaccination communication. Specifically, Study 2 considers how perceptions of source credibility, perceptions of argument strength, and past conversations with a source play a role in persuasion within the context of HPV vaccination. Moving one step further, Study 2 explores the role of these variables when a young woman is confronted with more than one message about HPV vaccination. Ultimately, the goal of Study 2 is to empirically test the MCF in the context of HPV vaccination communication to discover under which conditions persuasion is more likely to occur. Throughout Chapter 4, I pose research questions and hypotheses for Study 2.

Chapter 5 describes the detailed methods and results for Study 2. Three hundred and nine unvaccinated women were randomly assigned to one of nine message conditions in which they received a message from a mother source and a message from a doctor source, which was a modified approach to recreating the HPV vaccination communication environment of multiple messages. Based on the "typical" messages these sources use, as identified in Study 1, participants found themselves in message conditions in which the mother/doctor messages converged, diverged, or were mixed the on content and the recommendation to receive/not receive the HPV vaccine. Because persuasion attempts were both positive (i.e., receive the vaccine) and negative (i.e., do

not get the vaccine), behavioral intent to follow the source's recommendation (i.e., vaccinate, do not vaccinate) served as the primary outcome measure for Study 2.

Chapter 6 includes a discussion of the overall findings from this research project, implications for future work, and an explanation of the limitations of this project. First, I consider how the findings from these studies can be understood in terms of the effects of multiple sources and messages on vaccination decisions. Specifically, I address the two main outcomes (i.e., participants perceptions of a fictitious other "Sarah's" likelihood to follow a source's recommendation and participants ratings of their own likelihood to follow a source's recommendation) in relation to perceived source credibility, perceived argument strength, participants' experiences with past communication about this topic, and the message condition they were assigned to. These findings have implications for future cervical cancer prevention campaigns – including ones designed for the important sources of influence (e.g., mothers, health care providers). Second, the chapter illustrates the implications of using the MCF to understand this health topic from an ecological perspective (rather than focusing on one or two predictors of vaccination). I argue that this framework has utility for other health communication research topics in which researchers seek to consider the communication environment when designing health behavior interventions. Finally, I address the limitations for this research project which include participant factors (e.g., all participants were college students enrolled at one university in Kentucky) and method factors (e.g., limited formative research, struggles with designing an effective test of the MCF).

CHAPTER 2

Study 1 Theoretical Framework

What sets health communication researchers apart from other health behavior and social science researchers is our focus on the processes and effects of communication in changing health behavior. This includes an understanding of the health message, source of the message, and message channels but also an understanding of the message recipient. As noted by Witte (1995), both source variables and message variables influence whether an audience member accepts a message and is then motivated to act on it. For example, health communication researchers commonly value the influence of source characteristics (Ancker et al., 2009; Clayman, Manganello, Viswanath, Hesse, & Arora, 2010) and message characteristics (Gray & Harrington, 2011; Greene & Brinn, 2003; O'Keefe & Jensen, 2008; Quick & Bates, 2010) on health behavior. Researchers often employ a factorial experimental design for a message testing study by using source characteristics (e.g., source credibility, source similarity, source likeability) combined with message characteristics (e.g., gain-loss frame, evidence format; Anderson & McMillion, 1995; Chaiken, 1980; Jackson, 1994; Jones, Sinclair, & Courneya, 2003; Major & Coleman, 2012; Millar & Millar, 2000) to determine which condition is most effective at changing health behavior or predictors of health behavior. In addition to paying attention to source and message characteristics, Witte (1995) also notes that the audience profile (i.e., message recipient) acts as an important predictor of whether "the message fit[s] the audience" (p. 149). This need to focus on the audience – as well as the communication influences – points to the importance of conducting formative work with any audience and gathering key information like demographic and cultural variables, psychosocial

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variables, and, especially important, pre-existing beliefs and attitudes about the health behavior. Consistent with past work in line with the health belief model and other health behavior theories,

> If individuals regard themselves as susceptible to a condition, believe that condition would have potentially serious consequences, believe that a course of action available to them would be beneficial in reducing either their susceptibility to or severity of the condition, and believe the anticipated benefits of taking action outweigh the barriers to (or costs of) action, they are likely to take action that they believe will reduce their risks. (Champion & Skinner, 2008, p. 47)

However, in researchers' quest to (a) gain a fine-tuned understanding of specific communication variables and their effects on (b) a specific audience's health behaviors combined with (c) researchers' methodological need to exercise control in an experimental condition and isolate the influence of particular variables, what we may lose is the "bigger picture" of how communication can and does play a role in changing health behavior. In other words, the current state of persuasive health message design research may privilege too much a micro-level understanding of communication influences on health behavior and fail to account for the macro-level influences of many communication influences on health behavior. Therefore, in this chapter, I will further describe the need to consider the communication environment (rather than the effect of one or two source/message variables) within which HPV vaccination decisions happen, propose the message convergence framework (MCF) as the foundation for this study as well as the secondary role of exemplification theory, and present the first set of research questions that guide Study 1 (presented in the next chapter).

Message Convergence Framework

We live in a world where we do not suffer from a *lack* of communication and we will be exposed to many messages about any given topic. When it comes to our health and decisions about health procedures, the importance of communication becomes even clearer because we often make decisions based on the information we hear about the topic. As noted by Sellnow et al. (2009), real world situations that involve risk, like a decision about health, are "replete with technical experts providing multiple messages that compete for acceptance" (p. 7). Many other sources, like family members, friends, and mass media sources, also provide messages in these situations. In terms of processing these multiple messages and multiple sources, Sellnow et al. say that the "public must construe relevance and meaning from a given risk issue's myriad messages and relationships" (p. 8). Indeed, what may be missing from past persuasive health message studies is an understanding of the communication context that represents how people are likely to experience messages about risk, their competition and convergence, in the real world. In other words, rather than studying how one message from one source might influence an individual, a next step is studying source and content variables *together*.

While multiple messages may focus on a central theme (i.e., cervical cancer), the messages may differ on any number of characteristics (e.g., sender of the message, content of the message, framing of the message, accuracy of the message, timeliness of the message, etc.). Individuals exposed to these messages will process these multiple messages and will try to make sense of them; that sense-making process is complicated by how similar and different the messages are and by the individual receiver's frame of

reference (e.g., beliefs, attitudes, psychosocial variables, previous experience with this health issue). On the basis of these ideas, Sellnow et al. developed the message convergence framework (MCF) as a way to understand how messages on a similar topic interact and affect decision-making.

Sellnow and colleagues say they developed this framework because they wanted to take a message-centered approach in their research "as a means for understanding, evaluating and improving risk communication" (Sellnow et al., 2009, p. 3). They argue that "the interactive nature of risk communication, in tandem with the multiple, often conflicting messages on any given risk issue, leads us to view risk communication as a process of interacting arguments" (p. 10).   Much like a large majority of the work in health communication, which focuses on outcomes (i.e., changes in beliefs, attitudes, or health behaviors), previous models of risk focused on outcomes such as financial costs, population-level behavior trends, and from a more social scientific perspective, psychological variables that may influence individuals' behavior in reaction to risky situations. Sellnow and colleagues posit that this new framework, which focuses on the communication environment in times of risk, adds to our understanding of risk in a way that "complements" previous models. As will be shown in the next few sections, the use of the MCF complements existing health behavior and communication theories as well.

The message convergence framework stems from a rhetorical foundation, notably work by Perelman and Olbrechts-Tyteca (1969). These authors posit that within a communication environment, the following interactions occur:

- Interaction between various arguments put forward

- Interaction between the arguments and the overall argumentative situation

- Interaction between the arguments and their conclusion

- Interaction between the arguments occurring in discourse and those that are about the discourse (p. 460).

Sellnow and colleagues adopted this notion of argument interaction in their work. Specifically, message convergence occurs "when distinct bodies of knowledge overlap, resulting in some capacity of agreement" (p. 12); ultimately, a high degree of message convergence, or overlap, is desired because it reduces uncertainty for individuals when they are trying to make sense of a topic. In other words, when individuals hear consonant messages from different sources over time, they can feel more certain about the information – and, more importantly, the recommendations – contained within those messages because the messages are essentially reinforcing each other. When message divergence occurs and individuals encounter messages from multiple sources that contain dissonant information, individuals engage in sense making by evaluating the competing claims contained in various messages. As noted by Sellnow and colleagues, "observers collect and contemplate information from a variety of sources…and discuss this information…these discussions lead to a variety of options" or response options (p. 13). In other words, individuals may need to exert more cognitive effort to evaluate divergent messages because they must evaluate these competing claims.

Finally, when messages or arguments interact (i.e., individuals encounter more than one source delivering a message about a similar topic; these messages may interact in that they converge or diverge), individual and group level factors may affect how much weight is given to one message (or type of message) over another. These factors may include demographic and cultural variables, perceived credibility and similarity of

the source delivering the message, personal relevance to the topic being communicated, etc. (Sellnow et al., 2009). In some situations, messages may have congruence (complete consensus or single-mindedness), mutual exclusivity (one argument "wins" over all other arguments), dominance (one message, or message sender, is given more attention in the public discourse), and the burden of multiple sources (the need to process the interaction of many arguments). Figure 2.1 depicts a simple Venn diagram to illustrate how messages from different sources (each circle) interact and have varying degrees of convergence.

Figure 2.1
Message Convergence
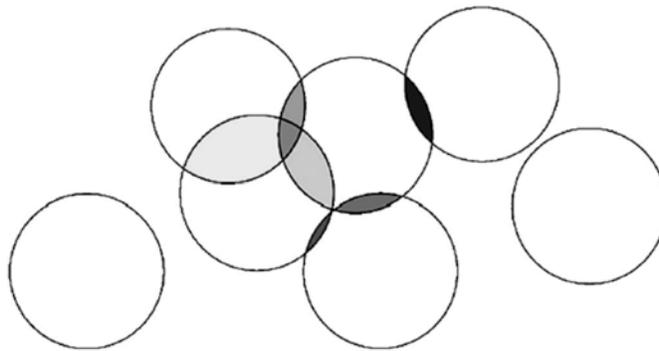
Figure 2.1 Venn Diagram depicting how multiple bodies of knowledge (messages) interact, taken from Sellnow, T. L., Ulmer, R. R., Seeger, M. W., & Littlefield, R. S. (2009). *Effective Risk Communication: A Message-Centered Approach*. New York: Springer.

The MCF was developed as a framework for understanding and ultimately *managing* risk about a given topic; it stems from a public relations mindset. As such, the limited amount of previous work using this framework has centered on understanding the multiple messages about a time of risk (i.e., a crisis) and using the MCF as a "best practices"

approach to managing those messages for the public. For example, Sellnow, Ulmer, Seeger, Littlefield, and Wood (2009) examined how a water company in Milwaukee dealt with an outbreak of the disease cryptosporidiosis, which is characterized by nausea, diarrhea, and fever, and is caused by an infestation of parasites in the water supply. They used the MCF to understand how multiple sources, such as the water company and city officials, were not communicating competently with each other or with the public properly to control the situation and keep people healthy. In this case study, they were able to identify gaps in communication, how multiple messages from different sources were providing conflicting information, and ultimately, provide recommendations for improving the communication in future situations.

In terms of health communication, this framework has utility in our field for at least two major reasons. First, it can provide a novel way for health communication scholars to understand how individuals process the variety of messages about any given health topic to which they are exposed, how those messages interact, and how that affects their health decision-making. While the focus of much persuasive health communication research has been on creating and testing messages, this complementary approach allows for the researcher to step back and examine the *existing* persuasive messages that an individual may already have seen or heard. Second, for many risk and crisis communication situations, there is a temporal element in which there is a marked beginning and ending of messages. For example, Anthony and Sellnow (2011) examined how Gulf Coast residents responded to different messages (and different channels, such as local vs. national media) in the aftermath of Hurricane Katrina. Obviously, the majority of messages for this situation were concentrated in one time period shortly

before and for several months after the hurricane. In other words, times of risk (i.e., a crisis) involve a temporal element that, to some extent, limits the amount of messages an individual is exposed to as well as limits the amount of time within which an individual must make a decision (e.g., to evacuate). On the other hand, a framework like MCF is essential in the context of health communication in which there may be no temporal element; people may be exposed to messages about a health topic for decades (e.g., smoking, exercise, the harms of drinking, whether eggs are good for you, etc.).

Exemplification Theory

What is also missing from previous work using the MCF is *how* multiple messages interact to influence a person's thoughts and actions. One theory that provides a complementary view of this phenomenon is exemplification theory. Developed and mostly studied in the context of mass media messages, exemplification theory helps us understand how people receive multiple messages about a common topic and then how an individual processes those messages and forms perceptions about the topic. While MCF tells us that messages about a particular phenomenon can and do diverge and converge and how that may affect an individual's actions, exemplification theory provides a foundation for understanding the cognitive and affective processing of those multiple messages. This theory privileges the notion of exemplars about a topic having a particularly strong influence on individuals' perceptions about the general topic. For example, why would a person pay more attention to one message compared to another? And how does a person compare a new message to the messages they've already received about this topic?

Exemplification theory provides a framework for addressing these questions. Zillman (2002) posits that "essentially for reasons of cognitive economy, organisms had to find ways of extracting experiential chunks from the continual flow of information about their environments" (p. 19). A trained media scholar, Zillman was especially interested in seeing how exposure to singular stories about a topic, which he labeled *exemplars*, would affect an individual's perceptions about the topic in general. The theory operates with three main assumptions:

1. Comprehension, storage, and retrieval of elemental, concrete events are generally superior to those of complex, abstract events.

2. Events of consequence attract more attention and are more vigorously processed than irrelevant events.

3. The incidence of events of the same kind is coded, and basal quantitative assessments are made on the ground of this coding. (Zillman, 2002, p. 25-26)

The theory also relies on two cognitive processing assumptions. The representativeness heuristic stipulates that base rate information (i.e., facts or statistics about a certain topic) might mean less to a person than personal stories they hear about the topic. In the same way, exemplars will vary with regard to how much they represent (or misrepresent) the base rate information. The availability heuristic stipulates that exemplars that come to mind quickly are more influential; access to these exemplars can be influenced by recency and frequency of the exemplars.

Although I make the argument here that exemplification theory is a useful complement to MCF, there are some limitations in how this theory can be used for this

research. First, most if not all of the research on exemplification has looked at media messages (Cox & Cox, 2001; Yu, Ahern, Connolly-Ahern, & Shen, 2010; Zillman, 1999, 2002). Scholars have given exemplars heard from interpersonal sources like friends and family little attention. Second, exemplification research has focused solely on the *message* and paid little attention to the persuasive impact of the source. One exception is a study by Aust and Zillman (1996) in which the source, who was portraying the victim of a crime, delivered the message in a calm manner or in an emotionally charged manner. The emotionally charged condition elicited from participants a stronger perception of risk to individual and that crime was a more severe issue compared to other conditions. Still, the only source variable manipulated in this study was emotional delivery, and the researchers failed to examine any number of other source variables that may have made a difference in message processing. Third, and perhaps most important, exemplification research focuses on cases or exemplars of events *about other people* and then studies how the aggregation of those exemplars in the mind of an individual might affect his or her perception of that topic. However, for many messages that one hears or sees, the message might be directly targeted at that individual. One study by Brosius and Bathelt (1994) hinted at this idea in a research project of five experiments using exemplification theory as a guiding framework. Each experiment consisted of a variety of messages about a topic and varied on vividness of language and representativeness of base rate information. Four topics were covered on a fictitious radio program during the course of the experiment; those topics were wine shortages in the area, replacement of coin pay phones with credit card pay phones, type of food in a nearby university cafeteria, and the obligatory use of classroom computers in the same nearby university. The authors claim

they varied the topics in terms of issue involvement (the experiment was done with university students, so the two university-related topics would be of more interest to them), which does somewhat address the notion of messages related to the individuals. However, other than examining the effect of general news stories about community issues that may or may not affect an individual, this and other research has failed to examine the exemplification of messages directed *at* an individual.

In the context of the current research project on message convergence dealing with HPV vaccination, exemplification theory provides some important guidance. First, this is one of the only communication theories that focus on processing multiple messages and, in fact, privileges the idea that there will be multiple messages about a topic that have some degree of similarity (i.e., they are about the same topic) but will also differ on important variables that may make the differences in what a person decides to do. In the case of HPV vaccination, this is relevant given the large amount of varied information that is communicated about this topic. Second, exemplification theory does not put limits on the amount of messages that can be considered or when those messages were received. In fact, this theory deals specifically with aggregation of many messages and, as noted by Zillman (2002) "closer examination of the projected longitudinal influence [of exemplars]…seems especially important….months and perhaps years might be more appropriate units of time…[for exemplars] to impose, if not dictate, the perception of issues" (p. 39). As previously noted, for a health communication topic like HPV vaccination, young women may hear many messages over a period of time. Third, much of the research in exemplification has focused on messages or stories about *risk*, which is in keeping with the current project. While a full summary of the research is not

practical (see Zillman & Brosius, 2006 for a full review), especially given the focus on mass media exemplars, Zillman (2006) concludes that "the involvement of just one emotional exemplar in an otherwise highly fact-focused [environment]…is capable of elevating assessments of risk to others and self." (p. 227). He goes on to say that we must be attuned to the effects of certain exemplars that draw attention to risk, change beliefs about risk, and cause an individual to feel a greater need to act to protect themselves from this risk. In this way, exemplification theory is perfectly suited to help researchers understand the potential persuasive impact of one or two messages about HPV vaccination among a milieu of other messages.

In the case of HPV vaccination, the decision to adopt or not adopt this prophylactic innovation is a complex one that happens in a milieu of messages over time; these messages contain information about a variety of risks such as risk of the vaccine, risk of HPV, and risk of cervical cancer. Our previous work with young adult women in Kentucky has revealed some interesting findings in terms of decision-making about this vaccine situated within a communication environment full of persuasive messages (Cohen & Head, 2013; Cohen et al., under contract; Head & Cohen, 2012; Head, Mills, & Vanderpool, under review; Mills, Head, & Vanderpool, under review). For example, some young women in Kentucky have reported hearing messages encouraging them to get the HPV vaccine from a variety of sources including mothers and family members (Mills, Head & Vanderpool, 2013), healthcare providers (Head, Vanderpool, & Mills, 2013), and mass media sources such as the Gardasil advertisements (Cohen & Head, 2013). In contrast, women also heard many negative stories about HPV vaccination. For example, young women reported how peers discussed their personal HPV vaccination

experience (e.g., how painful the shot was, what types of side effects they experienced) and how that information influenced their own decision (Head & Cohen, 2012). In another study, women attributed knowledge about dangerous side effects of the vaccine, such as affecting a woman's ability to have children and even women dying from the vaccine, to mass media sources (Mills, Head, & Vanderpool, 2013). Finally, some young women recounted conversations with mothers and healthcare providers in which they were advised *not* to get the vaccine (Cohen & Head, 2013; Head & Cohen, 2012). In the case of mothers (in this geographic area in particular), religious beliefs may affect their willingness to believe their daughters are at risk for an STD, although some of our research suggests mothers are more positive about vaccination for older adult daughters (Behringer & Friedell, 2006; Kahn et al., 2009; Mills, Head, & Vanderpool, 2013). For healthcare providers, these types of messages are consistent with other research in which Appalachian pediatricians are less likely than non-Appalachian pediatricians to recommend the HPV vaccine to their patients because of lower perceived susceptibility (Krieger, Katz, Kam, & Roberto, 2011).

The cumulative findings of these and other studies are the impetus for the current project. Young women are reporting many messages about HPV vaccination that they hear from a variety of sources, and it is unclear what impact the accumulation of these messages is having on vaccination decisions. Therefore, in addition to using the kind of research described in the previous paragraph as formative research for designing persuasive health messages (which is what it was originally used for), these findings also suggest that researchers are missing an important component of formative work and of the complex environment within which health decision making happens – what is the

persuasive impact of the HPV vaccination messages that young women are already exposed to in their communication environment? In other words, how do women sort through various *existing* messages from various sources and ultimately decide which source/message to trust?

Cline (2003) addresses this notion of multiple messages well when she says health communication should be seen as "a matrix of formal and informal communication contexts in which planned and incidental everyday messages abound, in both mediated and interpersonal forms" (p. 286). She goes on to argue that, especially in the case of informal interpersonal communication, it's important to understand how strong these messages can be in influencing health behavior. In a case study looking at the role of informal, interpersonal communication on HIV/AIDS behaviors (e.g., testing, disclosing a diagnosis, negotiating condom use, etc.), Cline found that most of the desired behavior changes by the participants were facilitated by interpersonal communication, not mediated messages. She issues a call to fellow health communication researchers to "attend to the sometimes more difficult-to-capture factors that influence health," such as those informal messages heard through interpersonal channels (p. 304). She also argues that in doing research that pays attention to these issues, we can move away from a researcher-initiated agenda toward a participant-centered agenda in designing our interventions. In other words, when we understand health and health behaviors in terms of how individuals creating meaning and communication about these topics from a holistic perspective, we can design interventions that privilege the voice and life world of the participant. These messages may end up being more effective, and in the case of HPV vaccination, this may be just the approach that is needed to increase vaccine uptake.

In sum, the MCF can be used to understand the communication environment within which an individual makes a decision about a particular topic. This framework has great potential for expanding researchers' understanding of communication processes and moving beyond studying one or two messages and their effect on individuals, especially in the field of health communication. Additionally, exemplification theory informs us that there are certain message characteristics that may influence an individual's recall and the subsequent persuasive power of that message. However, because these theoretical frameworks have not been used in the context of health communication about HPV vaccination specifically, formative work – in line with Cline's argument – needs to be done in order to understand the communication environment around this topic beyond the previous work reported above. In other words, to really study the way in which young women sort through various messages from various sources – and ultimately figure out which messages and sources have the most persuasive impact – researchers must first understand what that communication environment looks like. Therefore, Study 1 addressed the following research questions:

RQ1: What are the common sources, message features, and message channels that young adult women report hearing and seeing about HPV vaccination?

RQ2: How do young adult women discuss these messages interacting in a communication context and influencing their decision to vaccinate?

To address these questions, Study 1 takes an in-depth look at how young women discuss the messages they've encountered about HPV vaccination and allows researchers to understand what the HPV vaccination communication environment looks like. Semi-structured interviews with young adult unvaccinated women reveal the common sources

and messages about HPV vaccination these individuals encounter (i.e., memorable messages) as well their descriptions of the consonant and dissonant characteristics of these sources and messages. Specifically, these interviews query young women about the sources and content of existing persuasive messages - or exemplars - about HPV vaccination. This formative work lays the foundation for better understanding HPV vaccination communication and shaping future research and interventions for this population.

CHAPTER 3

Study 1 Theoretical Framework

The primary objective of Study 1 is to better understand and explain the HPV vaccination communication environment for young adult women. To address this objective and the specific research questions posed in the previous chapter, I used previously gathered interview data that was part of a larger project on various women's health issues and included both vaccinated and unvaccinated women. Examining only the unvaccinated women's responses and applying the MCF as an a posteriori framework, I explored these young women's recall and report of messages received about HPV vaccination to help elucidate the communication environment within which they decided against HPV vaccination. In the following sections, I describe the participants in Study 1 and explain procedures for collecting and then analyzing the data. I then provide a discussion about the findings and provide the reader with a list of limitations for this study.

Methods

Participants and recruitment. Participants were 39 unvaccinated women who spoke English and were between 18 and 26 years old. Women were recruited from a large Midwestern university through two different channels: a) flyers were placed around campus advertising the study and women were offered a $10 iTunes gift card as an incentive for participating and b) a notice was put in the online recruitment site for students in the Department of Communication research pool and these students were given course credit for participating. The majority of participants were White ($n = 33$),

with a minority of women from African-American ($n = 4$) and other racial/ethnic groups ($n = 2$).

Procedures and protocol. Women contacted the principal investigator of the main study (Dr. Elisia Cohen) through the email address listed on the campus flyer or through the online department research sign-up system to sign up for the study and schedule an interview time. Interviews were conducted on campus in the PI's private office with the door shut, and all interviews were audio recorded. Participants provided informed consent before beginning the interview and before the audio-recording equipment was turned on. Interviews lasted between 10 minutes and 30 minutes, and all participants answered every question (even if their answer was "I don't know."). Interviews were transcribed verbatim. Prior to analysis, the PI and I read through the transcripts to remove any personal identifiers before analysis began and then assigned each participant a pseudonym. All study procedures were approved by the University's Institutional Review Board.

The interview data used for this study was actually previously collected as part of a larger study. In returning to the original interview protocol and the interview data, we realized that information germane to the current study was gathered in two ways. First, as part of the original study, women were asked open-ended questions about knowledge, attitudes, and vaccination decisions, which often included personal stories involving messages and message sources. Second, women were specifically asked to recall media messages, conversations with family/friends, and conversations with healthcare providers about HPV vaccination. We (the PI, Bethney Wilson, a research assistant on the project, and I) used previous literature on cancer prevention and HPV vaccination and our own

experience in the field to identify these questions from the original interview protocol that were germane to the current study. Specific to the MCF, we were interested in women's recall of messages about HPV vaccination, the sources who delivered those messages, and how women discussed multiple messages about this topic "interacting" in their communication environment. Related, the interview questions were open-ended and participants were not told to put a time limit on when they heard HPV vaccination messages; rather, they were free to discuss any and all HPV vaccine related messages they had encountered in their lifetimes.

Data analysis. The study used a deductive data analysis technique called provisional coding, which involves starting with a preset list of codes and allowing the data to inform more comprehensive codes throughout the process, to analyze the transcripts. In keeping with the theoretical framing (MCF) and the research questions guiding the study, we (K.H. and Bethney Wilson) met to discuss the provisional list of codes that was informed by the MCF (Sellnow et al., 2009) and our previous experience and work in HPV vaccination and health communication (Cohen & Head, 2013; Head & Cohen, 2012; Head, Vanderpool, & Mills, 2013; Mills, Head, & Vanderpool, 2013). Given his expertise on the theory, we also met with Dr. Tim Sellnow to discuss the study and ask for guidance on employing the MCF to analyze these transcripts.

In our initial reading of the transcripts, we coded for all message sources identified by participants and all HPV vaccination messages encountered by participants, as well as a preliminary coding of how participants discussed messages "interacting" (i.e., when a participant discussed two or more different sources delivering an HPV vaccination message). After this initial reading, we met to discuss more comprehensive

theoretically-informed categories based on the tenets of MCF and returned to the transcripts using these more developed categories. These included source characteristics (e.g., how frequently or infrequently a source was mentioned in relation to other sources), message characteristics (e.g., typical messages heard from each source, arguments made within each message for or against vaccination, the vaccination recommendation within each message), and finally, a more sensitive reading of message interaction. Specifically, we examined and coded for whether participants expressed messages diverging or converging and who the typical sources were in terms of message interaction. We met frequently to discuss findings and in the final read-through of the transcripts we gathered key exemplars for each finding.

Results

The purpose of this study was to better understand young adult women's HPV vaccination communication environment and specifically answer the following research questions: 1) What are the common sources, message features, and message channels that young adult women report hearing and seeing about HPV vaccination? and 2) how do young adult women discuss these messages interacting in a communication context and influencing their decision to vaccinate? Findings are discussed in the next few sections.

Primary sources of messages. Sellnow, Ulmer, Seeger, and Littlefield (2009) claim that "there are many bodies of knowledge contributing to risk communication on any given topic" and that each of these bodies of knowledge will address the risk in differing ways (p. 15). To address the first research question, we describe these bodies of knowledge and the typical messages participants recall hearing from each source, which in essence allowed us to map out what the communication environment for HPV

vaccination looks like. These findings included participants' recall of the major sources of information about HPV vaccination (including interpersonal and mediated sources), as well as the types of content in those messages (including what the typical messages were). Each of these sources and the content of their messages is described below and a summary of these findings is found in Table 3.1 at the end of this section.

Mothers. One of the primary sources of HPV vaccination messages was mothers. Typically, participants received messages warning against the HPV vaccine from their mothers, and there were two main reasons for the warnings. First, mothers warned against the immaturity and safety of the vaccine. Chelsea recalled a conversation with her mother about whether she should get the vaccine, but her mother was worried with "being the first generation of the vaccine, you know possible risks haven't been too widely, you know, observed." Similarly, Celia's mother told her "it's good to get it but I don't know if they know like the long-term side effects from it yet." Chloe's mother communicated her fears about the HPV vaccine by comparing it to past medications that were later proven harmful (e.g., Diethylstilbestrol or DES, given to women in the mid-twentieth century). She recalled "my mom…just said she worried about like, there have been things out in the past where they've thought were okay….then it's turned our like it's caused miscarriages and different things." Similar to Celia's and Chelsea's mothers, Chloe's mother recommended waiting and said "she would rather take the chance for at least a little bit longer until they know like absolutely for sure."

Second, some participants reported their mothers voiced anti-vaccination sentiments because they perceived their daughters to be sexually naïve (i.e., not sexually active or at least not having sexual intercourse). Quinn recalled that both of her parents

told her she didn't need to unless she was "sexually active." Despite reporting that she *was* sexually active (and therefore at risk for HPV), Quinn followed her parents' advice, perhaps so that she wouldn't have to confess to them that she was having sex. Dana identified a conversation with her mother about vaccination in which her mother "wasn't concerned about it…didn't feel like it was a priority" because her mother believed her to be sexually naïve. While Dana was sexually naïve at the time, she had since become sexually active (and therefore at risk for contracting HPV), but she had not decided to receive the vaccine. Lauren reported a similar story in which her mother said "well as long as you're not being sexually active, then we don't feel you need to get it." Lauren also said she had become sexually active after that conversation, but she had still decided not to vaccinate. Interestingly, despite personally knowing they were at risk for HPV because they were sexually active (all of these participants and similar others were able to identify HPV as an STD), these women still chose not to vaccinate despite being able to go to the university health clinic and receive the vaccine not only free of charge, but their parents would not need to find out.

Alternatively, fewer participants recalled their mothers promoting vaccination or, at the very least, neutrally discussing vaccination. In the cases of positive messages, sometimes mothers cited family history of cancer or just general worry about cancer as a risk that could be mitigated by this vaccine. Tammy said her mother "told me about it and she was like, I…would like you to have that because cancer is prominent in our family." Mary remembered her mother was very encouraging and said "you should get the vaccine so you don't have cervical cancer later." Some participants also recalled discussing the

HPV vaccine with their mother, but in recalling what those conversations were like, they did not indicate whether the conversations were positively- or negatively-valenced.

Healthcare providers. Participants also identified healthcare providers as a major source of information about HPV vaccination. There were three types of messages that participants recalled receiving from healthcare providers. First, compared to any other interpersonal source identified by participants, providers tended to offer women the most positive HPV vaccination messages and usually did so with somewhat forceful messages. Alyssa recalled her doctor saying "how easily you could get HPV…how like you can get it not through sex. This is just a good precaution [against cervical cancer]." (Alyssa's doctor was addressing the nature of transmission of HPV in that an individual need not have full sexual intercourse to spread or contract the virus.) Chloe recalled that her gynecologist was "very laid back" but that she was definitely "pushing it." Bailey remembered telling her doctor she wasn't sexually active yet and the doctor "was like even more excited about me having the vaccine because was like, I mean then for sure like you would be in the clear." She went on to say she was "really like pushing it and I remember even her nurse like, coming in." In these cases, despite positive encouragement from a healthcare provider touting the benefits of this vaccine in preventing the risk of HPV and cancer, participants decided against vaccination.

Second, some providers were pro-vaccination, but participants did not feel they "pushed" it at all; these instances also did not result in women getting vaccinated. Vicky remembered telling her doctor she had not received the HPV vaccine and the doctor said "okay, well you should.' And that's pretty much all she said about it. It wasn't like a lecture." Nina said she had gone to the gynecologist a couple of times and they always

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asked her about the HPV vaccine. When she told them she hadn't been vaccinated, she remembers they gave her some information in it but "they didn't go into description." Sarah also indicated her doctor did not provide forceful messages; she recalled, "my gynecologist one time asked me if I had it and asked me if I wanted it and I said no both times and she didn't push it any further….she did give me a pamphlet, though." For these unvaccinated women, it seems that neither very forceful nor more passive recommendations by providers were enough to motivate them.

The third type of message received from providers was similar to one voiced by mothers: Participants reported healthcare providers telling them the vaccine wasn't necessary because they weren't sexually active. Rebecca recalled a conversation with her doctor in which she asked the doctor if the vaccine was necessary: "I asked my doctor if I needed it if I wasn't having sex or anything and she said no." Lindsay reported a similar story when she asked her doctor if this vaccine was necessary for her since she wasn't having sex; he told her "no it wasn't necessary but…if you want to be on the safe side you can get it." This type of message is particularly troubling coming from healthcare providers who should be knowledgeable about the purpose of a vaccine – protecting against a virus *before* exposure to it (i.e., before becoming sexually active and therefore at risk for an STD).

Friends and other social acquaintances. While mothers and healthcare providers were the dominant sources of HPV messages that these participants recalled, a few participants reported receiving messages regarding the HPV vaccine from friends and other social acquaintances. These messages generally involved conversations related to the vaccine itself. Mary recalled "one of my friends said that she got it and it hurt real

bad. It hurt *real* bad." Sarah said both of her best friends got the vaccine and while "one

of them was just fine, the other one is really a[]verse to needles so she had a tough time

getting the vaccine." On the other hand, a couple of participants reported these sources

giving them pro-vaccination messages. Teresa indicated "my best friend…she told me

that I should." Celia said one of her friends had an abnormal Pap test and that her

healthcare provider encouraged her to get the vaccine as added protection for the future;

Celia expressed that "we were talking about that recently and about me possibly getting

it, too. She was just telling me about her experience with it."

  Gardasil mass media campaign. The majority of participants were able to recall

and identify the main theme, or catch line, from the Gardasil advertisements (i.e., "one

less"), and these commercials represented the most common mass media source. In fact,

a very common response among participants, when asked w*hen you hear the term HPV,*

what words or phrases come to mind, was "Gardasil." While this advertisement campaign

was arguably very effective at raising awareness and knowledge about HPV and the

vaccine, many participants felt the commercials were not really targeted toward them.

Olivia described the commercial as "mothers and daughters…talking about [how] you

need to encourage your children to take the HPV vaccination." Vicky had a similar

response to Gardasil advertisements; she said the ads were "like women and their like

young daughters going on picnics and stuff, just making sure that you get the vaccine."

Dana remembered "it was a lot of parent, or mother and daughters together and basically

it, I feel like it targeted more the mothers instead of the daughters." Nina described her

reaction to the advertisement by saying "it's always girls between the ages of like 11 and

18….which is like fine I guess, but girls just go around having fun and dancing and

climbing trees" did not motive her as a woman over 18 to act. In this sense, participants felt these advertisements were not targeting *them* to take action.

Other media sources. Beyond the Gardasil media campaign, a small number of participants reported exposure to messages related to the vaccine through other media sources. For example, participants reported viewing news segments on the harms and side effects of the HPV vaccine. Tammy even reported "there was a recent story in the media about an elementary school girl getting it and then she ended up dying the same day from it." Participants also cited stories that encouraged people to stop getting the vaccine, such as when Chloe said "I heard just recently in the news that something came out where they're actually saying that you shouldn't have gotten it and that you need to stop like, giving the doses." In these few cases, women did not identify a specific news source but rather used ambiguous terms like "news" or "media" to indicate the source. Overwhelmingly, in these few cases the messages recalled from other media sources were anti-vaccination in content.

Lack of messages. Participants were asked to identify the main message sources from which they received information about HPV and the HPV vaccine. While most participants could identify at least one message/message source, many reported receiving vague messages and some reported not receiving *any* messages about the HPV vaccine when prompted (e.g., "Can you recall a time you discussed the HPV vaccine with a healthcare provider? Mother? Family member? Media messages?"). There are two important points to make about the lack of HPV vaccination messages. First, participants may not have recalled discussions they had about the HPV vaccination, particularly when they decided not to receive it (as was the case for all women in this study). It may be that

these discussions were brief and not something that these young women could easily

recall after they made the decision not to receive the vaccine, especially if the

conversations happened a long time ago. Alternatively, the lack of participants reporting

messages from some sources (e.g., Renee reported *never* discussing HPV or cervical

cancer with her gynecologist!) represent real "missed opportunities" for promoting HPV

vaccination in these women's lives.

Second, when women reported a lack of messages and/or feeling like they weren't

well informed about the HPV vaccination, they consistently denied searching for

information on their own. Both Sydney and Tammy reported that healthcare providers

did not give them a lot of information about the HPV vaccine beyond simply

recommending it. When asked "aside from what little she told you, have you gotten or

looked for any other information on HPV? …on cervical cancer?" they both simply

replied "no" with no explanation for why they did not research it further. Renee said she

wasn't sure how susceptible she was to HPV and that she didn't know "because we don't

know a lot about it. We don't research it as lengthy as we could and there's not a whole

lot of information out their either." This lack of information seeking on the part of these

women may reflect their desire to not be vaccinated in the first place; in other words, they

do not care to research it further because they have already decided against vaccination.

Table 3.1
Common HPV Vaccination Messages and Message Sources

Source[a]	Message[b]
Mothers and grandmothers	The vaccine could have harmful unknown side effects. You are not sexually active so you do not need to vaccinate. Additional: *Positive/neutral discussion of HPV vaccination.*

Table 3.1 (continued)

Source[a]	Message[b]
Healthcare providers	The HPV vaccine is a powerful tool for protecting yourself against this STD. (*Forceful recommendation*) Have you had the HPV vaccine? (*Question but no recommendation*) If you are not sexually active, you do not need to vaccinate.
Gardasil advertisement	*Raised awareness about HPV and the vaccination.* *Messages not aimed at young adult women, but rather mothers of young girls.*
Other media outlets	The Gardasil vaccine causes serious adverse side effects.
Friends and social acquaintances	Getting the vaccine is painful and there can be unpleasant short-term side effects. Additional: *Pro-vaccination but not forceful.*
Lack of messages	*Could not recall discussions/exposure to HPV vaccination messages.* *Denied searching for more information about HPV vaccination after reporting they have little information about this health issue.*

Note. [a]Sources listed in order of most commonly reported. [b]Messages listed in order of most commonly reported. Italicized verbiage represents general message content or interpretation of message by participants, un-italicized text represents more concrete examples of messages recalled.

Message convergence in action. Beyond simply describing the common sources and messages about HPV vaccination, participants also described how these messages interacted. In line with the tenets of message convergence framework, the term

interaction describes the ways in which women explained how messages from different sources converged or diverged on the content of the message and the recommendation for or against vaccination. Three types of HPV vaccination message "interaction" emerged in the findings (divergence, convergence, and still interacting), and each is described below.

First, participants discussed examples of message divergence, in which participants perceived conflicting information and/or recommendations about the HPV vaccine from different sources. In an instance of divergence, Alyssa recalled, "my mom was very against it, the shot, so she doesn't want me to get it and so she was trying to help me explain why I shouldn't get it but then it was, then I went to the doctor and she…explain[ed] why I should get it so it was kind of a decision I needed to make." The interaction of messages from mothers and healthcare providers – when the mother was being unsupportive and the healthcare provider was being supportive – was the most common instance of diverging interaction recalled by participants. A few participants reported more than those two sources interacting and diverging. Michelle wove a story of many sources that influenced her decision: "I would not get it unless I absolutely had to and my parents, my mother never pressured me to get it. She said I should get it but I never really thought about it and my gynecologist actually recommended it as well but I just never really listened to it. And then once I started seeing the ads, I heard about it and I was kind of a little bit more, I didn't really want to do it. And then I had friends that got it that started like breaking out from it; like I know a girl that like had a really bad rash from it and stuff like that and then they were getting recalled and they were scared about it because they had them. And I heard they are really painful and just I don't like really

like shots at all so." Vicky also reported divergence about HPV vaccination from multiple sources, but she was vague in exactly *who* was saying these messages: "Some people say it's necessary, some people are like if you want it, get it. It's not a big deal if you don't get it."

Though less common than instances of divergence, instances of convergence were also reported by participants. These were cases in which participants perceived that two or more sources provided similar information about the HPV vaccination and a similar recommendation. There were two types of divergence. Participants reported negative-valenced convergence, such that two or more sources advocated against HPV vaccination. Penny recalled "well, I was going to get it and my mom worked in a medical office and…so she didn't really recommend it, [and] like, the doctor recommended not getting it." Other times, participants reported this negative-valenced convergence, but did not provide details on the exact sources, suggesting that perhaps these were rumors. Beth said, "I've heard some things…is it that like some girls pass out or get dizzy. Because that's I've heard that from like certain…[pause], I think there was one fatal case but I'm not really sure about that."

Participants very rarely reported positive-valenced convergence, in which two or more sources advocated for vaccination. In one of those cases, Lindsay reported many positively-valenced sources. She said, "I've heard about it through my doctor and I know there's, I mean we talked about it in health class and it was freshman year of my high, in high school so I can barely remember what we talked about it but I know you can get a shot for it and there's been lots of commercials for it so I mean I'm sure it's probably good to get the shot but I haven't gotten it but I do know people that have gotten it to

prevent HPV….[and] I did talk to my grandmother about it because she had seen the commercials, well the Gardasil and she was encouraging me to get it." Lindsay's explanation of message convergence represents the best case scenario (many forms of positive encouragement), yet this did not result in Lindsay's vaccination.

The third type of interaction was our discovery that some participants were still in the process of sorting through messages and evaluating them; in essence, we (and others in the research community) may have falsely labeled these women as "unvaccinated." Instead, there might be two groups of "unvaccinated women" – those who are decidedly unvaccinated and those who are still undecided. After some women discussed the positive encouragement they received about the HPV vaccination and why they have still chosen not to receive it, many indicated they were still thinking about it (rather than, as we assumed, deciding against vaccination). As Nicole said, "but I don't know because like I don't know if I'm going to change my mind yet…so like right now I don't but I don't know about the future and so it might be a good precaution for me; I haven't really decided." Alyssa also indicated she "kind of postponed it [her decision]." Celia explained, "like I've talked to people but I just haven't taken the step to go get it." Recognizing that women may still be mulling over their decision to vaccinate as they process multiple messages about HPV vaccination provides an important distinction for women whom researchers previously labeled as just unvaccinated; instead, researchers may need to view women in stages of vaccination decision-making.

Discussion

The findings from this formative investigation using MCF to analyze women's discussions of HPV vaccination decisions provide strong support for continuing this

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work. These results add to our understanding of this health behavior and, germane to communication researchers, our understandings of communication about this health behavior. By having a clearer understanding of the communication environment within which HPV vaccination decisions are made, communication scholars can work to test these different messages to determine which may be the most influential. These results provide two directions for additional research.

First, these findings point to important message sources about HPV vaccination, as identified by young women. Mothers and healthcare providers seemed to play the largest "roles" in these decisions for young adult women, with media and peers also playing a part in conveying information that could affect their decision. This finding is consistent with previous literature that shows mothers and healthcare providers are strong influences on HPV vaccine decision-making (Conroy et al., 2009). However, what this study adds is an understanding of the typical messages received from these different sources, which may help us better understand how and why these sources are influential. For example, mothers were more likely to focus on the *risk of the vaccine*, or the short term risk of side effects. Alternatively, healthcare providers were more likely to focus on the *risk of cervical cancer*, or the long term risk of being infected with HPV which could cause cervical cancer. The young adult women in our study recalled healthcare providers providing positive encouragement for vaccination more so than others. Interestingly, participants recalled some instances in which both healthcare providers and mothers expressed messages about *no risk* of HPV because a young woman wasn't sexually active and therefore was not in need of this vaccine. Mass media and peer sources played a smaller role, with participants discussing *risk of the vaccine* messages (e.g., side effects)

as one of the main messages received from these sources. Finally, one particularly important finding from this study is the lack of information seeking for some of the women who expressed uncertainty about the safety and efficacy of the HPV vaccine. This point in particular is deserving of further study, with an eye toward developing interventions to increase vaccination for this population.

Second, these findings provide the first report of how young women discuss the interaction of HPV vaccination messages they've received. Only unvaccinated women were included in this study because these women would be the target population for any intervention. Understanding how they discuss various message source/content interacting to persuade them to not receive the vaccine provides important insights for health communication researchers and practitioners. For example, women rarely reported positive convergence, meaning they are recalling many anti-vaccination messages in their lives. Additionally, women most often recalled and reported conversations with their healthcare providers and mothers, as well as how those two sources often "butted heads." This suggests the importance of further study on the influence of these two sources, but in tandem (i.e., how they interact). Finally, in speaking with young women who were unvaccinated, the finding emerged that some of these women are simply still in a state of deciding. This is consistent with previous work by Prochaska and colleagues looking at the stages of change behavior model and the role of decisional balance (1994). Stages of change is a behavior model which posits that individuals progress through a series of stages in their attempt to change a behavior and that interventions targeting individuals in certain stages can be very effective at "moving" individuals to the next stage (Prochaska & Velicer, 1997). Most commonly used to study behaviors that are habitual and require a

long-term change (e.g., smoking, exercise), the model also has usefulness for a behavior like vaccination, especially in light of the findings from the present study. Prochaska et.al (1994) investigated the role of a construct called decisional balance situated within the stage of change model across a variety of behaviors. Decisional balance is the idea that an individual will scan the environment to learn about the pros and cons of a something (e.g., a behavior) before making a decision. With regard to HPV vaccination, understanding the ways in which communication can affect a person's decisional balance is an important next step.

Limitations

This study is not without limitations. First, only unvaccinated women were included in the study. In choosing an approach for the formative work in this dissertation project, in which there was limited time and resources, the decision to use previously collected data and focus solely on unvaccinated women seemed the best choice. This is because unvaccinated women would be the target of any future HPV vaccine intervention. In addition, while a traditional approach to understanding behavior change is to design persuasive messages based on formative work and see if behavioral intentions or actual behavior is affected positively, an alternative approach is to understand what messages may be influencing behavioral intentions or actual behavior negatively. This information was gained through this approach. However, future work may want to focus on using this same approach with vaccinated women to discover what differences exist that may have been the impetus for vaccination. Recall that for the participants in this study, even receiving positive-valenced convergent messages did not result in their vaccination. Further investigating the possible differences in unvaccinated

and vaccinated young women's HPV vaccination communication environments may lead to some clues as to why these two groups differ on vaccination status. Additionally, in conducting research with vaccinated, partially vaccinated and unvaccinated women, it may be possible to develop a typology of "vaccination stages of change" that could prove useful for future intervention attempts.

Second, this interview technique relied on self-report of messages, requiring women to recall messages about this health topic for an undesignated amount of time. Some participants may not have remembered messages or message sources even if they had received messages. While definitely a limitation of the study, this self-report method is also in keeping with the tenets of exemplification theory. If an individual easily recalls messages about a topic, this means that this particular message is easily accessible and perhaps has "superior influence" on the individual (Zillmann, 2002, p. 28). Alternatively, not recalling messages about a topic from particular sources may be indicative of the low level of influence that message has on the individual. In other words, this formative research is perhaps strengthened by a reliance on participant recall of influential messages, because these are the messages most ripe for study from a health behavior change perspective. Related, the analysis was done on previously collected data and while the interview protocol did adequately address the specific research questions for this study, it may still be considered a limitation of this study. Specifically, in examining the multiple sources of HPV vaccine messages, the frequency with which young women discussed certain sources (at the expense of others) could also be due to the way in which the questions were asked. However, given that participants did mention a variety of sources and the weight of those sources (i.e., mothers and healthcare providers played the

largest role compared to others) is consistent with previous work in this area, this study can still be considered to have high external validity.

Third, all participants were recruited from one university in the same geographic area. Previous research identifying higher risks of HPV and cervical cancer with this population provided justification for this sample, but future work may want to focus on other geographic areas as well as women who chose not to go to college, as there may be important population differences.

Conclusion

The purpose of Study 1 was to gain a deeper insight of the communication environment around HPV vaccination in order to better understand what messages and sources are most influential. The findings allowed us to identify important sources of information for young adult women as well as the typical messages received from these sources. Additionally, the MCF allowed us to explore the interaction of these messages on young women's vaccination decisions. Continued application of the MCF can add to our understanding of HPV vaccination decisions. However, in moving beyond application, a next step is *testing* the MCF to study empirically the interaction of messages on individuals' behavior. In the Chapter 4, the findings from Study 1 serve as a foundation for expanding HPV vaccination-related MCF research and Study 2 is proposed as a message testing experiment.

CHAPTER 4

Given the findings from Study 1 in this project, the second part of this dissertation project attempts to move beyond formative work outlining the communication environment using the MCF by empirically testing the influences of multiple risk messages on personal vaccination intentions. Although Study 1 successfully identified HPV vaccination messages and sources of those messages, Study 2 will extend theorizing by empirically testing these different *existing* messages and their influence on young adult women to provide important information about how to best intervene within the communication environment to change vaccination behaviors. In order to have a starting place from which to develop interventions, researchers must identify which message and message source is most influential, whether that's in encouraging vaccination or in discouraging vaccination. This chapter builds on the findings from Study 1 to explore the rationale for Study 2 and its goals of identifying the impact of young women's perceptions of message content, message recommendation, and message source on their behavioral intent.

Study 2 Theoretical Framework

A common approach to understanding, predicting, and attempting to control health behavior change is a reliance on social cognition models of behavior. Per these social cognition models of behavior, such as those in line with the theory of reasoned action, we know that knowledge/beliefs and attitudes about a behavior predict behavioral intent, which is then posited as the most direct antecedent to behavior (Montaño & Kasprzyk, 2008). In addition to our previous work in Kentucky exploring sources of influence on HPV vaccination, we also identified some important audience profile

variables at play in HPV vaccination decision-making. Specifically, we found that some

women, both vaccinated and unvaccinated, have serious knowledge-attitude-practice gaps

(KAP-gaps) that suggest these women are vaccinating or not vaccinating without making

a fully informed decision (Cohen & Head, 2013). While the bias among public health

officials is that a vaccine like this one is desirable, such assumptions by officials and

vaccine program planners do not remove the need for the public to make *informed*

decisions about health.

 Informed decisions are important for at least two reasons. First, if women rely on

what other people say about this vaccine – and act upon that information – they may not

fully understand the risks and benefits of this innovation. This is arguably an ethical

issue. Second, and related, in the case of HPV vaccination in particular, if a woman is

not making an informed decision about vaccination (e.g., just getting the vaccine because

someone suggested she should), it is not unreasonable to assume this could have an

impact on her decision to return for doses 2 and 3. In other words, these women may not

have the preexisting attitudes and beliefs that are thought to influence behavior and,

therefore, these traditional theoretical approaches to understanding health behaviors and

designing interventions based on these types of theories may not be the most appropriate

theories for understanding this behavior.

 Instead, based on our work in Kentucky, it appears that for some women,

messages they receive from an important person in their life may be the reason they

decide to vaccinate (or not vaccinate). As noted in Cohen and Head (2012),

  Women prompted by their mothers or doctors to get the shot often did not have

  any knowledge or perceived risk of HPV. As Isabel V. expressed, "I have no idea

what it is honestly, I got the Gardasil® shot…... my mom wanted me to … but I

don't know anything about it." (p. 17)

It is in this sense that researchers have demonstrated the importance of studying the

communication about this topic, in addition to understanding the beliefs and attitudes

about the health behavior. For example, in the quote above, we see that a young woman

trusted what her mother had to say about the vaccination and followed the mother's

advice, which resulted in the young woman becoming vaccinated. From a

communication perspective, one can see that both source (in this case, the young

woman's mother) and message (in this case, the mother's argument for vaccination)

made the difference in this young woman's health behavior. While this example shows

that communicative influences can positively affect behavior (i.e., Isabel decided to

vaccinate), there may be other young women who listen to influential sources telling

them *not* to vaccinate.

Therefore, after studying the common messages and message sources about HPV

vaccination (Study 1 of this project), the next step is for researchers to attempt to

understand the ways in which young women process these messages and make decisions

based on the information they received. In moving beyond just *identifying* the common

messages and message sources about HPV vaccination, which was done in Study 1 of

this project, the next step is attempting to understand *how* young women are processing

these messages and making decisions based off the information they receive.

Specifically, we need to focus on perceptions of source and perceptions of messages

about HPV vaccination. Recall that MCF posits that source and message content

variables (particularly how messages overlap) are important cues for an individual, and

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exemplification theory goes one step further in saying that some message content variables may cause a message to have superior influence on an individual. Consistent with past work on message processing, Witte (1995) notes that "although source and message variables can be thoughtfully considered in a central route manner, they are believed to act more often as variables that cue a person to accept a message, and thus tend to be processed peripherally" (p. 148). In other words, rather than assuming that individuals extensively process and analyze every message they receive, a more realistic approach is to assume that individuals use shortcuts to process the many messages they receive on a topic. This idea is related to the tenets of MCF and exemplification theory, which both privilege the idea that in an environment of multiple messages, some message factors and message source factors may operate as heuristics that stand out of offer memorable cues, whereas others do not, suggesting that messages may be processed differently. Understanding how and why those messages and sources have heuristic value, in the context of the communication environment around HPV vaccination, is the underlying purpose of Study 2. The next section delves deeper into the notion of message processing, specifically related to certain source and message factors.

Message Processing

During the late 1970s and early 1980s, two groups of scholars were simultaneously developing quite similar message processing models: Petty and Cacioppo presented their elaboration likelihood model (1981, 1986) and Chaiken presented her heuristic-systematic model of information processing (1980). These two communication models postulate that under certain conditions, individuals may use a great amount of cognitive effort to systematically or centrally process a persuasive communication, and in

these cases, persuasion is thought to be stronger and more lasting. Alternatively, individuals may use minimal cognitive effort to heuristically or peripherally process a persuasive communication and in these cases, persuasion is thought to be less strong. While appreciable differences exist between the models (see especially, Eagly & Chaiken, 1993, Chapter 7), the purpose and scope of this project does not necessitate delving into those differences.

Two of the most commonly studied variables in this line of research are source credibility and argument strength. Evidence of having relied on source credibility to make a decision is often thought to indicate a message receiver is processing the message peripherally, relying on the credibility of the source as a cue that they should follow the recommendation; evidence of having assessed argument strength is thought to indicate a message receiver is processing the message centrally, carefully scrutinizing the content (Stiff & Mongeau, 2003). These dual-process theories are, by no doubt, impressive models with extensive research to support these claims. However, as noted by Stiff and Mongeau (2003), tests of models like the ELM rely on the same experimental procedure over and over again:

> The procedure involves creating two persuasive messages that advocate the same position…one message contains strong arguments supporting the message recommendation and the other contains weak arguments. These messages are attributed to a highly or less expert source as they are presented to research participants. (p. 220)

It is in this between-subjects research design that these theories have fallen short time and again to have higher ecological validity. They fail to take into account the effect of more

than one message on an individual's decision to enact a behavior (i.e., be persuaded to vaccinate or not vaccinate). While it is certainly understandable that this research design is allows for a high degree of control in an experimental test, it fails to consider the processing of *more than one persuasive message about a topic*. In other words, what we don't quite know is what role variables like source credibility and argument strength play when an individual encounters different messages from more than one source as happens in the real world. Study 2 is designed to address this gap.

Related, the tenets of the MCF (e.g., convergent messages from two different sources are more persuasive than divergent messages from two different sources) have not been empirically tested. As noted earlier in Study 1, this research project is the first time the MCF has been applied to the health communication setting. What little research has been done using the MCF in risk and crisis communication has also suffered from methodological limitations from a reliance on the case study. As noted by Sellnow and colleagues (2009),

> The case study approach works well to identify best practices for risk communication because individual situations are defined or isolated, relevant data are collected about the situation, and the findings are presented in such a way that a more complete understanding is reached regarding how messages shape perceptions and serve to prompt particular responses from those hearing the messages. (p. 53)

Many sources of data can be used in a case study, such as mass media messages, interviews with key stakeholders, and news coverage. The use of case studies is limiting, though, and while it may be appropriate to study temporal events such as a time of crisis

and gain knowledge about best practices for similar future situations, this theory can benefit from rigorous testing and application.

As every young social scientist learns, a defining characteristic of a strong social scientific theory is that it must be falsifiable or testable in nature (Griffin, 2006; Shoemaker, Tankard, & Lasorsa, 2004). Although to date, the MCF has not benefited from empirical tests, whether in risk or health communication, it is a testable framework. This current limitation of MCF, combined with Stiff and Mongeau's (2003) critique of the traditional experimental design used in most ELM-type studies, leads to the proposed design in the current study: an experimental test of MCF in which there are messages from more than one source that may vary on source credibility and argument strength, but in which the true "manipulation" comes from exposing individuals to different combinations of messages, not just message variables. In the following sections, I separately define source credibility and argument strength and their role in the persuasion process, and I pose several research questions and hypotheses relevant to the current study. After examining each variable separately, I return to a discussion of the MCF and the effect of multiple messages on message processing and persuasion, and I pose the final research question and hypothesis addressing the first experimental test of the MCF.

Source credibility. While sources may vary or differ on any number of characteristics, one of the most powerful source factors in persuasion is source credibility. Especially in the case of recommendations about a health behavior (in this case, having an injection), source credibility may serve as an important cue for individuals. In other words, if someone you think is credible tells you to do something

(or not do something), then you are more likely to listen to that person than if you heard the same message from a less credible person.

O'Keefe (2002) defines source credibility in the following way: "Credibility (or, more carefully expressed, perceived credibility) consists of the judgments made by a perceiver (e.g., message recipient) concerning the believability of a communicator" (p. 181). Perloff (2010) explains that source credibility is made up of three characteristics or qualities: competence is defined as the perceived knowledge or abilities of the communicator, caring is defined as the perceived goodwill of the communicator toward the audience, and trustworthiness is defined as the perceived honesty or character of the communicator.

For a variety of studies in communication, including health communication, higher source credibility consistently predicts attitude change and behavior change in the desired direction (Pornpitakpan, 2004). On the basis of the formative work done in Study 1 of this project, two sources emerged as the most prevalent in a young women's communication environment about HPV vaccination: mothers and healthcare providers. However, it was unclear how credible participants perceived these sources to be in the context of HPV vaccination. In Study 2, which is described in more detail in the next chapter, participants will read messages from both a mother figure and a doctor; each of these sources will provide a recommendation in their message with regard to HPV vaccination. Based on previous research which says that sources perceived as more credible will be more persuasive, the following research hypothesis is posed:

Hypothesis 1: Participants will be more likely to follow the recommendation given by sources they perceive as higher in competence/caring/trustworthiness than sources they perceive as lower in competence/caring/trustworthiness.

In addition to the overall effect of source credibility on persuasion, an understanding of what type of perceived source credibility (competence, caring, trustworthiness) has the largest persuasive impact unclear. What is clear is that both O'Keefe and Perloff emphasize in their writings that source credibility is not so much about the communicator as it is about the message receiver's perception of the communicator within a certain context. In fact, Perloff (2010) notes that "the role a communicator plays…can determine the particular aspect of credibility that is most important" (p. 169). While it would seem that medical competence of a trained healthcare provider would be the most influential factor in recommendations about a vaccine, Study 1 revealed that mothers also played an influential role. Also, recall that for all of the women in Study 1, none of them had decided to get vaccinated. Therefore, because it is unclear which *type* of source credibility may have the largest impact in the context of HPV vaccination, the following research question is posed:

Research Question 1: Which type of source credibility (i.e., competence, caring, trustworthiness) best predicts participants' likelihood to follow the source's recommendation?

Finally, given that this study privileges the role that multiple messages from multiple sources over time has on an individual's health behavior, it would be negligent to ignore the role that past communication with sources has on an individual's perception of similar sources in this study. While it is not possible to control for and account for all

HPV vaccination messages from past sources within Study 2, it is possible to measure

past communication with the two sources that emerged as the most influential in Study 1:

mothers and healthcare providers.   Therefore, the following research question is posed:

Research Question 2: What effect does past conversation with a source have on

participant's perceptions of that source's credibility (i.e., competence, caring,

trustworthiness)?

Argument strength. What do advertisers, politicians, cult leaders and health

behavior change researchers all have in common? When presenting individuals with a

persuasive message, they hope it is perceived as a *strong* argument. Zhao, Strasser,

Cappella, Lerman, and Fishbein (2011) define perceived argument strength as "audience

members' perceptions of the quality, strength, and persuasiveness of the arguments

employed in a persuasive communication" (p. 50). Several researchers note that

argument strength is one of the most manipulated and studied message variables in

persuasion research, and all suggest that a message perceived as stronger will be more

persuasive (Johnson, Maio, & Smith-McLallen, 2005; Johnson, Smith-McLallen, Killeya,

& Levin, 2004; Petty & Cacioppo, 1986; Petty, Kasmer, Haugtvedt, & Cacioppo, 1987).

Because of this focused attention, as is the case in many commonly studied social

science variables, there are many different measures of argument strength (Bassili, 1996).

In reviewing those past measures and identifying the limitations, Zhao et al. (2011)

developed a new measure that accounted for a more robust assessment of perceived

argument strength. For example, they included items in their scale that addressed not

only likelihood of agreement or favorability toward an argument, which is consistent with

the dominant measure of argument strength through a thought listing technique, but also

items that addressed perceived truth value, perceived importance, perceived confidence in the argument's recommendation, and a summative measure assessing individuals' perceptions of the argument quality.

Unfortunately, the use of this more robust measure in research suffers from two limitations. First, most likely due to the scale developers own desire to use their scale once it was published, many of those same individuals have used the scale in their own research that centers on one behavior – smoking (Bigsby, Cappella, & Seitz, 2012; Falcone et al., 2011; Lee & Cappella, 2013; Lee, Cappella, Lerman, & Strasser, 2011, 2013). In addition, many of these published smoking studies appear to come from the same large dataset, suggesting the scale has not been tested in truly different contexts. Second, for this series of studies, the scale was used as a manipulation check for argument strength manipulations for created messages. While this is arguably a positive use of the scale, it fails to consider the perceived argument strength of existing persuasive communications.

In this research project, the persuasiveness of existing messages in the communication environment is the focus. Therefore, given previous research that suggests arguments perceived as stronger are more persuasive and given the formative work done in Study 1 that suggests some young women may be likely to follow recommendations about HPV vaccination without the preexisting attitudes and beliefs that are thought to drive behavior, the following research hypothesis is posed:

Hypothesis 2: Messages perceived as having a stronger argument (i.e., type of
risk) will be positively related to participants' likelihood to follow the message

recommendation (i.e., vaccinate, not vaccinate) more than arguments perceived as weak.

Message convergence framework. Finally, in returning to the theoretical framework of this research project, the MCF informs the main hypotheses and research questions for Study 2. Recall from Chapter 2 that Sellnow et al. (2009) claim that "when distinct bodies of knowledge overlap, resulting in some capacity of agreement" (p. 12), there is message convergence. In instances of a high degree of message convergence, individuals can feel more certain about the messages they hear and the recommendations contained within those messages. Hence, an individual would be more likely to follow the consonant recommendation. Alternatively, in cases of message divergence, individuals must evaluate the claims in those messages and make choices about whom to believe and which recommendation to follow.

The findings from Study 1 indicate that mothers and healthcare providers played the largest role in young women's HPV vaccination communication environment and participants most often discussed the interaction of messages from these two sources (i.e., my doctor was saying this, but my mom was saying this). Additionally, Study 1 findings revealed that mothers often voiced messages about the risk of the vaccine and recommended against vaccination and healthcare providers often voiced messages about the risk of cervical cancer and recommended vaccination. Findings also revealed that both sources voiced messages about the lack of risk due to a young woman's sexual naivety and in these cases, both mothers and healthcare providers recommended against vaccination.

In designing Study 2, I used these findings from Study 1 to enhance external validity by using these two sources in an experiment in which young adult females receive messages from both sources. Study 2 uses these two sources (i.e., *mother*, *healthcare provider*) and each source delivers messages within the same condition (rather than having some participants read a message by one source and other participants read a messages by another source). Additionally, these sources will deliver messages that converge (agree) or diverge (disagree) on two message content variables, as informed by Study 1: type of risk message (i.e., *risk of the vaccine, risk of cervical cancer, no risk of HPV because woman is sexually naïve*) and recommendation for vaccination (i.e., *receive vaccine, do not receive vaccine*). By asking women to read messages that vary on source and content about HPV vaccination, we can extend the MCF by testing messages against each other and determining which message combination is the most influential. However, for the purpose of analyses and because the most likely focus of a future intervention would be with a healthcare provider, the following hypothesis is set up to test the likelihood of participants following the doctor's recommendation. As such, the hypothesis reads:

> **Hypothesis 3**: Participants who receive messages from doctors and mothers that converge on both recommendation and risk (i.e., Conditions 1, 5, 9) will be more likely to follow the recommendation given by the doctor than participants who receive messages from both sources with mixed message characteristics (divergence on risk and convergence on recommendation; i.e., Conditions 7, 3) or participants who receive messages from mothers and doctors that diverge on both recommendation and risk (i.e., Conditions 2, 4, 6, 8).

Finally, in keeping with the idea that the MCF considers the communication environment around an issue over time (i.e., a movie reel) and not just one or two messages at one time point (i.e., a snapshot), this study considers the effect of past messages about HPV vaccination and their effect on current message processing. While an analysis of all previous HPV vaccination messages from all sources is not within the scope of the current project, it is feasible in the current study to measure the effect of previous conversations about HPV vaccination with one of the two target sources (i.e., mother and doctor) on a young woman's likelihood to follow the recommendation of the doctor. Hence, the final research question for Study 2 is:

> **Research Question 3**: What is the effect, if any, of past conversations with a mother/mother figure or doctor on participants' likelihood to follow the doctor's recommendation?

In sum, Study 2 is proposed as an experiment to test these common message sources and message content variables to determine what may be the most influential source/message combination. Rather than the common source vs. message factorial design discussed at the beginning of this chapter, Study 2 adheres to the MCF and uses a source/message vs. source/message design to uncover how these elements affect a woman's decision to vaccinate. Study 2 methods and results are detailed in the next chapter.

CHAPTER 5

Study 2

Building on the findings from Study 1 and in an effort to provide an empirical test of the message convergence framework, Study 2 is an experiment in which participants are randomly assigned to read messages from two difference sources (mother, healthcare provider), that convergence, diverge or have mixed message characteristics with regard to type of risk message and type of recommendation. As noted previously, work in HPV vaccination promotion, specifically, and previous health persuasion research, generally, have for the most part fallen short in empirically examining how individuals process persuasive communications from more than one source at the same time. Study 2, outlined in this chapter, addresses this gap.

Method

Participants and Recruitment

Participants in this study were 309 unvaccinated women ranging in age from 18 to 30 years old ($M = 19.58$, $SD = 1.99$). The university institutional review board approved all procedures prior to study initiation. Given the 3 X 3 modified factorial design (described below) and the desired minimum of 30 participants per cell for adequate power (Cohen, 1988; VanVoorhis & Morgan, 2007) resulted in a desired sample size of at least 270 participants. Recruitment of participants continued until this number was reached and slightly exceeded for the experimental survey.

Participants were recruited in two ways. First, female students enrolled in lower-division communication courses were notified about this study through the Department of Communication's research participant pool which includes more than 3,500 students

enrolled in general education courses from a variety of majors across the university. Students who are a part of this research participant pool are required to complete a research study as part of course requirements. The following study information (Table 5.1) was posted to all students on an electronic bulletin board:

Table 5.1
Study Recruitment Information

Study Information	
Study Name	Communication About Women's Health
Abstract	Quick online survey about HPV vaccine and Cervical Cancer
Description	This study is a quick (no more than 15-20 minutes) survey that you can complete at home on your own computer. We want to know your perspectives on the HPV vaccine and cervical cancer prevention so that we can design better health messages about these topics.
Web Study	This is an online study. Participants are not given the study URL until after they sign up.
Eligibility Requirements	Female; between 18-30 years old; has not received the HPV vaccine
Duration	20 minutes
Credits	1 Credits

Students who desired to participate in the study and met the eligibility requirements enrolled in the study. A total of 279 participants were recruited through this method. Second, women were recruited from the general campus population through fliers posted around campus and in some sorority houses; the fliers contained the same information listed in the SONA post above with the exception of the incentive offer of an online $10 Target gift card or an online $10 Starbucks gift card. The flier prompted eligible participants to email the principal researcher to complete the study. A total of 30 participants was recruited through this second recruitment method.

Although there were some significant differences between the two groups of participants on demographic variables (see Table 5.2), there were no significant

differences on any of the outcome variables (discussed below). Therefore, these two

groups are considered one sample from this point forward.

Table 5.2
Participant Characteristics

	Combined Total	SONA Research Participants	General Campus Population	Difference
Age	19.58 (*SD*=1.99)	19.35 (*SD*=1.91)	21.53 (*SD*=1.53)	$t = -6.06$ ($p < .001$)
College Classification				$X^2 = 110.74$ ($p < .001$)
Freshman	53.4% (*n* = 165)	59.8% (*n* = 168)	0% (*n* = 0)	
Sophomore	16.5% (*n* = 51)	17.8% (*n* = 50)	3.2% (*n* = 1)	
Junior	19.4%(*n* = 60)	16.4% (*n* = 46)	45.2% (*n* = 14)	
Senior	8.7% (*n* = 27)	6.0% (*n* = 17)	32.3% (*n* = 10)	
Graduate Student	0.6% (*n* = 2)	0% (*n* = 0)	6.5% (*n* = 2)	
N/A	1.0% (*n* = 4)	0% (*n* = 0)	12.9% (*n* = 4)	
Race				
White/Caucasian	82.8% (*n* = 256)[a]	81.1% (*n* = 228)	90.3% (*n* = 28)	$X^2 = 1.60$ ($p = .21$)
African American	10.7% (*n* = 33)	11.4% (*n* = 32)	3.2% (*n* = 1)	$X^2 = 1.97$ ($p = .16$)
Hispanic	2.9% (*n* = 9)	2.5% (*n* = 7)	6.5% (*n* = 2)	$X^2 = 1.56$ ($p = .21$)
Asian	5.2% (*n* = 16)	5.3% (*n* = 15)	3.2% (*n* = 1)	$X^2 = 0.27$ ($p = .61$)
Native American	1.0% (*n* = 3)	1.1% (*n* = 3)	0% (*n* = 0)	$X^2 = 0.33$ ($p = .56$)
Pacific Islander	0.6% (*n* = 2)	0.7% (*n* = 2)	0% (*n* = 0)	$X^2 = 0.22$ ($p = .64$)
Other	3.6% (*n* = 11)	3.9% (*n* = 11)	0% (*n* = 0)	$X^2 = 1.26$ ($p = .26$)

Note. [a] Participants were allowed to provide multiple answers for race; therefore, each

race category is treated as a separate variable and separate chi-square tests were run to

test for differences.

Procedures

Eligible participants who signed up for the research study were directed by either

email or the student research participant pool system to an Internet survey to complete the

study. All participants read an IRB-approved consent form on the opening webpage and

were instructed that by clicking the "continue with survey" button at the bottom of the

page, they were giving implied consent to participate in the study. A copy of the consent form can be found in Appendix A.

As a safety measure to ensure that only eligible participants completed the experimental section of the Internet study, participants were prevented from completing the study if they answered "male" to the gender question or answered "18 or younger" or "31 or older" to the age question; instead, they were directed to a page that informed them of their ineligibility for this study and thanked them for their time. However, despite the requirement that participants be unvaccinated, if they answered "Yes" to receiving the HPV vaccine, they were allowed to complete a short survey about past HPV vaccination behaviors (see Appendix B for list of questions). They were then directed to the end of the survey where they filled out their information and were given credit for completing the study.

There was a specific reason that these vaccinated women were allowed to complete a portion of the survey. Some women might have honestly believed they met the general eligibility requirement of being "unvaccinated" if they had only received doses 1 or 2 of the 3-part HPV vaccine series. In other words, if a woman had only received doses 1 or 2, she might believe she is eligible to complete a study about not having the HPV vaccine (since she didn't complete the three-dose regimen). Seventy-one participants (68 participants recruited through the research participant pool and three participants recruited through the general student population) completed the modified, shorter version of the survey as partially vaccinated participants. However, because the objective of the study was to examine truly unvaccinated women and their responses to the message manipulations, and because these partially vaccinated women did not

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complete the experiment portion of the study, this group of participants is not mentioned again.

Truly unvaccinated women completed the entire experimental survey. The survey began with demographic questions, questions regarding attitudes and beliefs about the HPV vaccine, questions regarding past conversations about HPV vaccination, and questions about behavioral intent to receive the HPV vaccine. Next, participants were randomly assigned by the Qualtrics Internet survey software to one of nine message conditions. Finally, participants completed post-test measures including perceptions of source credibility, perceptions of argument strength, and questions about behavioral intent to receive the HPV vaccine. (All measures and the messages are described in detail in the following sections.) After completing the Internet survey, all participants were thanked for their time and were presented with a debriefing page including information about the HPV vaccine (CDC, 2011) and information about the HPV vaccine's availability in the Lexington area. Finally, students eligible for the study incentive were directed to a second "survey" asking them to enter their first name, last name, email address, and their preference for a $10 Target gift card or a $10 Starbucks gift card. Participants recruited through the student research participant pool were asked to enter their first name, last name, and student ID in order to receive credit for participating. All participants were assured that their personal information would not be associated with their responses in the survey and the information was solely gathered in order to deliver their gift card or course credit, respectively.

Message Manipulations

There were nine message manipulations for the experiment embedded in the

Qualtrics Internet survey. As noted earlier, the Qualtrics program randomly assigned

participants to one message condition and then directed participants to the post-test

measures. When participants reached the message stimuli section of the Internet survey,

they first read a prompt that set up a story about a young woman named Sarah who was

thinking about getting the HPV vaccine. The prompt read:

> *Now, we want you to read a story about a young woman who is*
>
> *deciding whether to get the HPV vaccine. She hears information about*
>
> *the vaccine from a couple of different sources, which may influence her*
>
> *decision. Please read Sarah's story and respond to the questions.*
>
> *Sarah is a 20 year old sophomore at the University of*
>
> *Kentucky. She has had sex a couple of times while in college, although*
>
> *she has not told her mother or doctor that she is sexually active.*
>
> *She is trying to decide whether she should get the HPV*
>
> *vaccine. She knows that HPV is a common sexually transmitted disease*
>
> *among college-aged women. She also knows that a vaccine is available*
>
> *to protect against the types of HPV known to cause cervical cancer.*
>
> *Sarah hears messages about the HPV vaccine from both her*
>
> *doctor and her mother.*

After reading this prompt, participants were instructed to click "Next" (and

randomly assigned to one of the message conditions) to read the messages from the

doctor and mother. Message conditions varied on type of message received from mother

source (short-term risk of HPV vaccination, long-term risk of cervical cancer, or no risk

of HPV infection) and type of message received from doctor source (short-term risk of

HPV vaccination, long-term risk of cervical cancer, or no risk of HPV infection). To

clarify, participants received a message from *both* the mother and doctor source; to

control for order effects, participants were randomly assigned to receive the mother or

doctor message first. As a secondary check of order effects, a series of t-tests were run to

determine if there were any significant differences on the major experimental variables of

interest in the study (i.e., those measured in the posttest: perceptions of source credibility,

perceptions of argument strength and the likelihood to follow recommendation outcome

variables). No significant differences were found for any of these variables between

groups that read the mother message first or groups that read the doctor message first.

Table 5.3 provides information on the content of the messages; the choice of sources and

the content of the messages in this experiment were informed by the formative research

conducted in Study 1.

Table 5.3
Experiment Messages

Message Type	Content of Message	
	Argument	Recommendation
Short-term Risk	You may experience side effects from the vaccine like a fever or rash, especially because it is new.	I don't think you should get the vaccine.
Long-term Risk	There is the risk of you getting HPV and it turning into cervical cancer later in life.	I think you should get the vaccine.
No Risk	You aren't sexually active, so there is no risk of you getting HPV in the first place.	I don't think you should get the vaccine.

The created message conditions resulted in a 3 x 3 design, presented below in Table 5.4. Each condition is numbered to facilitate discussion. As is described later, message conditions 1, 5, and 9 converge on risk and recommendation; message conditions 3 and 7 diverge on risk but converge on recommendation; and message conditions 2, 4, 6, and 8 diverge on risk and recommendation.

Table 5.4
Factorial Design

| | | Healthcare Provider | | |
		Short-term Risk	Long-term Risk	No Risk
Mother	Short-term Risk	1	2	3
	Long-term Risk	4	5	6
	No Risk	7	8	9

Measures

The survey for this study can be found in Appendix B; however, only items relevant to the main dissertation study and that address the hypotheses and research questions described in Chapter 4 are presented in detail here. These items are basic demographics (presented in the "Participants and Recruitment" section above), the control variables of past conversations about HPV vaccination with both mother/mother figures and healthcare providers, independent variables of interest (including the stimuli-related measures of perceived source credibility and perceived argument strength), and outcome variables including behavioral intention to receive the HPV vaccine. In addition, several computed variables are discussed below, such as the type of past conversations about HPV vaccination with mother/mother figures and healthcare providers, type of message stimuli convergence, and likelihood to follow the message recommendation with regard to HPV vaccination receipt.

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Past Conversations. Participants' past conversations about HPV vaccination with their mothers/mother figures and healthcare providers were measured. This measure included two parts. First, each participant was asked if she had ever discussed HPV vaccination with the two sources of interest in this study *(have you ever discussed HPV vaccination with a healthcare provider? have you ever discussed HPV vaccination with your mom or a mother figure in your life?)*; the response items for these questions were (a) yes or (b) no. If a participant answered yes, she was then asked to indicate what that source advised her to do (*did the provider (a) recommend that you receive the HPV vaccine or (b) recommend that you not receive the HPV vaccine?; did your mom (or mother figure) (a) recommend that you receive the HPV vaccine or (b) recommend that you not receive the HPV vaccine?*). Descriptive statistics for this variable are presented in Table 5.5 below.

Table 5.5
Past HPV Vaccination Conversations

	Percent	Frequency
Self-Reported Past Conversation with Mother		
No	40.1%	*n* = 125
Yes	58.7%	*n* = 183
Recommended vaccination	59.6%	*n* = 109
Did not recommend vaccination	40.4%	*n* = 74
Self-Reported Past Conversation with Doctor		
No	48.1%	*n* = 150
Yes	51.0%	*n* = 159
Recommended vaccination	89.3%	*n* = 142
Did not recommend vaccination	10.1%	*n* = 16

For the purpose of analysis, two ordinal variables representing the nature of past conversations were created: one for past conversation with a participant's mother/mother figure and one for past conversations with a healthcare provider. Participants who reported no past conversations were given the value of 0, participants who reported past

conversations with a recommendation to not receive the HPV vaccine were given the value of -1, and participants who reported past conversations with a recommendation to receive the HPV vaccine were given the value of +1. Therefore, every participant had two past conversation scores, one that reflected the nature of her conversations with her mother/mother figure and one that reflected the nature of her conversations with her healthcare provider.

   Source Credibility. Each participant's perception of source credibility was measured using a seven-point semantic differential scale (McCroskey & Teven, 1999). Source credibility is composed of three separate subscales and each subscale has its own set of items: *competence* (intelligent/unintelligent, untrained/trained, inexpert/expert, informed/uninformed, incompetent/competent, and bright/stupid); *caring* (cares about me/doesn't care about me, has my interests at heart/doesn't have my interests at heart, self-centered/not self-centered, concerned with me/not concerned with me, insensitive/sensitive, and not understanding/understanding); and *trustworthiness* (honest/dishonest, untrustworthy/trustworthy, honorable/dishonorable, moral/immoral, unethical/ethical, and phony/genuine). Because each participant read messages from both a mother source and a doctor source, each participant answered these questions twice. Scores on the three separate subscales are presented separately for each source below. Included in these sections are descriptions of dichotomizing each subscale into high and low values using a median split (MacCallum, Zhang, Preacher, & Rucker, 2002). Detailed descriptive statistics (including scores on each credibility scale for each condition) are presented in Table 5.6 for the mother source and Table 5.7 for the doctor source.

Mother competence. Exploratory factor analysis (principal components) revealed a unidimensional solution to the mother competence subscale. The six competence items were averaged (*M* = 3.91, *SD* = 1.25) to compute a reliable (*α* = 0.84) *perceived mother competence* scale, where higher scores indicate that participants perceived the mother source to be more competent. Using a median split (*Md* = 3.83), scores on the *perceived mother competence* scale were dichotomized into a new variable; participants who rated the mother's competence at or below 3.83 were labeled as *perceived low mother competence* and participants who rated the mother's competence above 3.83 were labeled as *perceived high mother competence*.

Mother caring. Exploratory factor analysis (principal components) revealed a unidimensional solution to the mother caring scale. The six caring items were averaged (*M* = 5.23, *SD* = 1.26) to compute a reliable (*α* = 0.85) *perceived mother caring* scale, where higher scores indicate that participants perceived the mother source to be more caring. Using a median split (*Md* = 5.33), scores on the *perceived mother caring* scale were dichotomized into a new variable; participants who rated the mother's caring at or below 5.33 were labeled as *perceived low mother caring* and participants who rated the mother's caring above 5.33 were labeled as *perceived high mother caring.*

Mother trustworthiness. Exploratory factor analysis (principal components) revealed a unidimensional solution to the mother trustworthiness scale. The six trustworthiness items were averaged (*M* = 5.18, *SD* = 1.18) to compute a reliable (*α* = 0.89) *perceived mother trustworthiness* scale, where higher scores indicate that participants perceived the mother source to be more trustworthy. Using a median split (*Md* = 5.17), scores on the *perceived mother trustworthiness* scale were dichotomized

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into a new variable; participants who rated the mother's trustworthiness at or below 5.17 were labeled as *perceived low mother trustworthiness* and participants who rated the mother's trustworthiness above 5.17 were labeled *perceived high mother trustworthiness.*

Doctor competence. Exploratory factor analysis (principal components) revealed a unidimensional solution to the doctor competence scale. The six competence items were averaged ($M = 5.45$, $SD = 1.47$) to compute a reliable ($\alpha = 0.92$) *perceived doctor competence* scale, where higher scores indicate that participants perceived the doctor source to be more competent. Using a median split (Md = 5.83), scores on the perceived doctor competence scale were dichotomized into a new variable; participants who rated the doctor's competence at or below 5.83 were labeled as *perceived low doctor competence* and participants who rated the doctor's competence above 5.83 were labeled as *perceived high doctor competence*.

Doctor caring. Exploratory factor analysis (principal components) revealed a unidimensional solution to the doctor caring scale. The six caring items were averaged ($M = 4.86$, $SD = 1.23$) to compute a reliable ($\alpha = 0.88$) *perceived doctor caring* scale, where higher scores indicate that participants perceived the doctor source to be more caring. Using a median split ($Md = 4.83$), scores on the perceived doctor caring scale were dichotomized into a new variable; participants who rated the doctor's caring at or below 4.83 were labeled as *perceived low doctor caring* and participants who rated the doctor's caring above 4.83 were labeled as *perceived high doctor caring*.

Doctor trustworthiness. Exploratory factor analysis (principal components) revealed a unidimensional solution to the doctor trustworthiness scale. The six trustworthiness items were averaged ($M = 5.23$, $SD = 1.24$) to compute a reliable ($\alpha =$

0.92) *perceived doctor trustworthiness* scale, where higher scores indicate that

participants perceived the doctor source to be more trustworthy. Using a median split

(*Md* = 5.17), scores on the perceived doctor trustworthiness scale were dichotomized into

a new variable; participants who rated the doctor's trustworthiness at or below 5.17 were

labeled as *perceived low doctor trustworthiness* and participants who rated the doctor's

trustworthiness above 5.17 were labeled as *perceived high doctor trustworthiness.*

Table 5.6
Mother Source Credibility Descriptive Statistics

Type of Credibility	Condition	Reliability (*α*)	Mean Score (*M*)	Standard Deviation (*SD*)
Perceived Mother Competence	Overall – All Conditions	.84	3.91	1.25
	Mom Short-term Risk	*.87*	*3.60*	*1.21*
	Condition 1		3.80	1.22
	2		3.27	1.17
	3		3.74	1.20
	Mom Long-term Risk	*.89*	*4.81*	*1.09*
	4		4.69	.94
	5		4.84	1.10
	6		4.92	1.25
	Mom Lack of Risk (No Sex)	*.75*	*3.32*	*.88*
	7		3.49	.88
	8		3.18	.90
	9		3.29	.86
Perceived Mother Caring	Overall – All Conditions	.85	5.23	1.26
	Mom Short-term Risk	*.89*	*5.02*	*1.24*
	Condition 1		4.91	1.34
	2		4.94	1.23
	3		5.21	1.16
	Mom Long-term Risk	*.80*	*6.11*	*.78*
	4		6.08	.74
	5		6.16	.75
	6		6.12	.87
	Mom Lack of Risk (No Sex)	*.86*	*4.55*	*1.17*
	7		4.77	1.01
	8		4.42	1.44
	9		4.47	1.00

Table 5.6 (continued)

Perceived Mother Trustworthiness	Overall – All Conditions	.89	5.18	1.18
	Mom Short-term Risk	*.92*	*4.90*	*1.17*
	Condition 1		4.93	1.22
	2		4.83	1.15
	3		4.94	1.16
	Mom Long-term Risk	*.91*	*5.92*	*.94*
	4		5.83	.89
	5		5.95	.93
	6		5.97	1.02
	Mom Lack of Risk (No Sex)	*.85*	*4.73*	*1.05*
	7		4.98	.91
	8		4.73	1.12
	9		4.50	1.07

Table 5.7
Doctor Source Credibility Descriptive Statistics

Type of Credibility	Condition	Reliability (α)	Mean Score (*M*)	Standard Deviation (*SD*)
Perceived Doctor Competence	Overall – All Conditions	.92	5.45	1.47
	Doctor Short-term Risk	.94	5.23	1.50
	Condition 1		5.22	1.56
	4		5.33	1.61
	7		5.14	1.36
	Doctor Long-term Risk	.92	6.30	.96
	2		6.27	.97
	5		6.28	1.10
	8		6.37	.80
	Doctor Lack of Risk (No Sex)	.90	4.81	1.46
	3		5.01	1.40
	6		5.14	1.58
	9		4.29	1.29
Perceived Doctor Caring	Overall – All Conditions	.88	4.86	1.23
	Doctor Short-term Risk	.89	4.71	1.20
	Condition 1		4.70	1.41
	4		4.76	1.18
	7		4.68	.99
	Doctor Long-term Risk	.88	5.41	1.11
	2		5.31	1.15
	5		5.33	1.08
	8		5.59	1.11

Table 5.7 (continued)

	Doctor Lack of Risk (No Sex)	.86	4.45	1.19
	3		4.65	1.20
	6		4.63	1.29
	9		4.07	.98
Perceived Doctor Trustworthiness	Overall – All Conditions	.92	5.23	1.24
	Doctor Short-term Risk	.94	5.01	1.28
	Condition 1		5.02	1.44
	4		5.05	1.17
	7		4.95	1.25
	Doctor Long-term Risk	.92	5.84	1.00
	2		5.68	1.02
	5		5.96	.90
	8		5.90	1.07
	Doctor Lack of Risk (No Sex)	.91	4.83	1.20
	3		4.96	1.22
	6		5.13	1.36
	9		4.41	.92

Argument Strength. A modified version of the perceived argument strength

scale developed by Zhao et al. (2011) was used to identify participants' perceptions of the

message argument strength. The scale contains two parts. First, participants responded

to five statements/questions about the target argument using a four-point Likert type scale

where 1 = strongly disagree and 4 = strongly agree; items included the following: (a) the

statement is a reason for ___ that is believable, (b) the statement is a reason for ___ that

is convincing, (c) the statement gives a reason for ___ that is important to me, (d) the

statement put thoughts in my mind about wanting/not wanting to___, and (e) overall, how

much do you agree or disagree with the statement? Second, participants responded to the

following question using a four-point Likert-type scale where 1 = very weak and 4 = very

strong: Is the reason the statement gave for _____ a strong or weak reason? Scores are

averaged to calculate an overall perceived argument strength score.

Before presenting the descriptive analysis for this scale, three important points are

worth making. First, participants responded using this scale twice, once in reference to

the mother message they read and once in reference to the doctor message they read.

Therefore, each participant has a perceived mother argument strength score and a

perceived doctor argument strength score. (Note that to ensure participants were

responding to the correct argument, the specific message [e.g., the mother message] was

listed at the top of the page as participants answered the questions in this scale.)   Second,

because participants were randomly assigned to one of three different messages from

each source, only one-third of participants $(n=103)$ responded to each different message.

In other words, 103 participants read the mother's short-term risk message, 103

participants read the mother's long-term risk message, and 103 participants read the

mother's no risk message. This was also the case for the doctor messages. Regardless of

the message read, a higher score indicates a participant believed the message contained a

stronger argument, and therefore these different versions of the scale are comparable.

However, because the arguments were part of the experimental manipulation and were

completed by different individuals randomly assigned to that message condition, scores

are left separate for each argument type for the purpose of analysis; see the Message

Manipulations section above to review the content of the arguments. Third, as seen in the

scale statements/questions above, there are blanks where the researcher must indicate the

message outcome participants must respond to. On the basis of message condition (i.e.,

whether the source recommended the HPV vaccination or whether the source

recommended not getting the HPV vaccination), participants were directed to respond to

the appropriate message recommendation outcome on the argument strength scale. For

example, if participants read a message in which the recommended outcome was to not

get the HPV vaccine, the first scale item read, "the statement is a reason for not getting the HPV vaccine that is believable."

In sum, there are six different versions of this scale that were answered in this study, but each participant only answered two of them. Descriptive data analyses for these scales are presented below and the information is presented visually in Table 5.8.

Mother short-term risk message perceptions (n = 103). Exploratory factor analysis (principal components) revealed a unidimensional solution to the argument strength scale for participants' perceptions of the short-term risk message delivered by the mother source. The six argument strength items were averaged ($M = 2.27$, $SD = 0.62$) to compute a reliable ($\alpha = 0.88$) *perceived mother short-term risk message argument strength* scale, where higher scores on the scale indicate that participants perceived the mother short-term risk message as a stronger argument.

Doctor short-term risk message (n = 103). Exploratory factor analysis (principal components) revealed a unidimensional solution to the argument strength scale for participants' perceptions of the short-term risk message delivered by the doctor source. The six argument strength items were averaged ($M = 2.67$, $SD = 0.79$) to compute a reliable ($\alpha = 0.91$) *perceived doctor short-term risk message argument strength* scale, where higher scores on the scale indicate that participants perceived the doctor short-term risk message to be a stronger argument.

Mother long-term risk message (n = 103). Exploratory factor analysis (principal components) revealed a unidimensional solution to the argument strength scale for participants' perceptions of the long-term risk message delivered by the mother source. The six argument strength items were averaged ($M = 3.15$, $SD = 0.56$) to compute a

reliable ($\alpha = 0.86$) *perceived mother long-term risk message argument strength* scale, where higher scores indicate that participants perceived the mother long-term risk message to be a stronger argument.

Doctor long-term risk message (n = 103). Exploratory factor analysis (principal components) revealed a unidimensional solution to the argument strength scale for participants' perceptions of the long-term risk message delivered by the doctor source. The six argument strength items were averaged ($M = 3.39$, $SD = 0.55$) to compute a reliable ($\alpha = 0.86$) *perceived doctor long-term risk message argument strength* scale, where higher scores indicate that participants perceived the doctor long-term risk message to be a stronger argument.

Mother no risk message (n = 103). Exploratory factor analysis (principal components) revealed a unidimensional solution to the argument strength scale for participants' perceptions of the no risk message delivered by the mother source. The six argument strength items were averaged ($M = 2.05$, $SD = 0.70$) to compute a reliable ($\alpha = 0.88$) *perceived mother no risk message argument strength* scale, where higher scores indicate that participants perceived the mother no risk message to be a stronger argument.

Doctor no risk message (n = 103). Exploratory factor analysis (principal components) revealed a unidimensional solution to the argument strength scale for participants' perceptions of the no risk message delivered by the doctor source. The six argument strength items were averaged ($M = 2.50$, $SD = 0.81$) to compute a reliable ($\alpha = 0.90$) *perceived doctor no risk message argument strength* scale, where higher scores indicate that participants perceived the doctor no risk message to be a stronger argument.

Table 5.8
Argument Strength Descriptive Statistics

Argu-ment	Recommen-dation	Reliabil-ity (α)	Condi-tion	Mean Score (M)	Standard Deviation *(SD)*
Mother short-term risk	Do not vaccinate	.88	*Overall*	*2.27*	*.620*
			1	2.36	.633
			2	2.24	.636
			3	2.20	.600
Doctor short-term risk	Do not vaccinate	.91	*Overall*	*2.67*	*.79*
			1	2.77	.857
			4	2.59	.890
			7	2.67	.610
Mother long-term risk	Vaccinate	.86	*Overall*	*3.15*	*.563*
			4	3.10	.644
			5	3.17	.481
			6	3.20	.560
Doctor long-term risk	Vaccinate	.86	*Overall*	*3.39*	*.546*
			2	3.35	.600
			5	3.27	.583
			8	3.54	.420
Mother no risk	Do not vaccinate	.88	*Overall*	*2.05*	*.697*
			7	1.99	.565
			8	2.02	.808
			9	2.13	.700
Doctor no risk	Do not vaccinate	.90	*Overall*	*2.50*	*.807*
			3	2.70	.751
			6	2.47	.850
			9	2.32	.800

Behavioral Intent

Vaccine receipt. There were two vaccine receipt intent measures that served as outcome variables for this study. First, each participant was asked what she believed the character in the story, Sarah, would do regarding HPV vaccination (*how likely do you think Sarah would be to get the vaccine?*). Second, participants were asked what they would do regarding HPV vaccination after reading Sarah's story (*in thinking about what*

you read today [i.e., the messages from Sarah's mother and doctor], how likely are you

to get the vaccine?). For both of these questions, participants responded using a four-

point Likert-type scale where 1 = very unlikely and 4 = very likely. Higher scores on

each of these measures indicated that participant believed Sarah/she would be more likely

to get the vaccine.

Likelihood to follow the recommendation within the message. Because many

of the research questions and hypotheses sought to identify the likelihood to follow the

recommendation offered in the messages (rather than intent to get the vaccine), a

secondary outcome measure was calculated called *likelihood to follow recommendation.*

Each participant answered questions related to her beliefs about how likely Sarah would

be to get the vaccine and how likely she personally would be to get the vaccine

(discussed in the "Vaccine receipt" section above). These variables were recoded into

four "likelihood to follow recommendation" variables through a multi-step calculation.

First, each condition was coded for whether the mother source recommended to get or to

not get the vaccine. The same was done for each condition regarding the doctor's

recommendation. Next, the message conditions were nominally coded for whether or not

the source recommended the vaccine. Each message condition in which the mother

recommended to get the vaccine (conditions 4, 5, and 6) was coded as a 1. Each message

condition in which the mother recommended not getting the vaccine (conditions 1, 2, 3,

7, 8, and 9) was coded as a 2. Similarly, each message condition in which the doctor

recommended to get the vaccine (conditions 2, 5, and 8) was coded as a 1. Each message

condition in which the doctor recommended not getting the vaccine (conditions 1, 3, 4, 6,

7 and 9) was coded as a 2. See Table 5.9 below for the message conditions and type of

recommendation from each source.

Table 5.9
Recommendations by Sources for Each Message Condition

Condition	Mother says…			Doctor says…		
	Get it	Don't get it	Recommendation Score	Get it	Don't get it	Recommendation Score
1		*	2		*	2
2		*	2	*		1
3		*	2		*	2
4	*		1		*	2
5	*		1	*		1
6	*		1		*	2
7		*	2		*	2
8		*	2	*		1
9		*	2		*	2

Recall that participants answered two vaccine receipt intention questions (i.e.,

how likely do you think Sarah would be to get the vaccine? and *in thinking about what*

you read today [i.e., the messages from Sarah's mother and doctor], how likely are you

to get the vaccine?) and that for both of these questions, participants responded using a

four-point Likert type scale where 1 = very unlikely and 4 = very likely. Scores for these

questions, combined with the recommendation from each source in each message

condition, were used to calculate four new outcome variables, *[Sarah or Participant]*

likelihood to follow [mother's or doctor's] recommendation. For conditions in which the

mother source recommended to get the vaccine, the values associated with the original

vaccine receipt intent measure (1 = very unlikely 2 = somewhat unlikely, 3 = somewhat

likely, and 4 = very likely) were used as the new values for the *likelihood to follow*

recommendation variable because following the recommendation to get the vaccine (i.e.,

following the mom's advice) and being more likely to get the vaccine (i.e., a higher

score) would be the same. In other words, for conditions in which the mother

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recommended getting the vaccine, participants' scores on the behavioral intent measure

(likelihood to get the vaccine) were simply copied for the new *likelihood to follow*

recommendation outcome variable. For conditions in which the mother recommended

not getting the vaccine, the values were recoded into the opposite value (1 = 4, 2 = 3, 3 =

2, and 4 = 1) because if a participant read a message where the mother source

recommended to not get the vaccine, yet the participant selected that Sarah/she would be

very likely to get it, then this would result in the participant's believing Sarah/she would

be very unlikely to follow the recommendation. The data transformation (or, recoding) is

displayed below in Table 5.10. This process resulted in four new variables (*Sarah's*

likelihood to follow mother recommendation, Participant's likelihood to follow mother

recommendation, Sarah's likelihood to follow doctor recommendation, and Participant's

likelihood to follow doctor recommendation), which served as the primary outcome

variables for most of the analyses.

Table 5.10
Recoding of Likelihood Outcome Variables

Sarah's/Participant's Likelihood to Get Vaccine (Original Scores on Behavioral Intent Measure)	Recoded into			
	Sarah's/Participant's Likelihood to Follow Mother Recommendation		Sarah's/Participant's to Follow Doctor Recommendation	
	Conditions Where Mother Says Get Vaccine	Conditions Where Mother Says Not Get Vaccine	Conditions Where Doctor Says Get Vaccine	Conditions Where Doctor Says Not Get Vaccine
1 = very unlikely	1 = very unlikely	4 = very unlikely	1 = very unlikely	4 = very unlikely
2 = somewhat unlikely	2 = somewhat unlikely	3 = somewhat unlikely	2 = somewhat unlikely	3 = somewhat unlikely
3 = somewhat likely	3 = somewhat likely	2 = somewhat likely	3 = somewhat likely	2 = somewhat likely
4 = very likely	4 = very likely	1 = very likely	4 = very likely	1 = very likely

Finally, for each of the four the new likelihood to follow recommendation variables created above, a final dichotomized variable for each likelihood outcome was created. If a participant scored 1 or 2 on the likelihood to follow the recommendation, this was recoded into 1 for "not likely." If a participant scored a 3 or 4 on the likelihood to follow the recommendation, this was recoded into a 2 for "likely."

Results

Hypothesis 1

Hypothesis 1 predicted that participants will more likely follow the recommendation given by sources they perceive as higher in credibility/caring/trustworthiness than sources they perceive as lower in credibility/caring/trustworthiness. A series of *t*-tests was run to test this hypothesis. Given that there are four different *likelihood to follow recommendation* variables and three different types of source credibility for each source (competence, caring, and trustworthiness for both mother and doctor), the total number of *t*-tests run was 12. Results are reported below and in Table 5.11 (for Sarah's likelihood to follow recommendation from both sources) and Table 5.12 (for participant likelihood to follow recommendation from both sources).

Source credibility and Sarah's likelihood to follow mother's recommendation. Results showed no significant differences for *perceived mother competence*, $t(304) = 0.80$, $p = 0.42$ ($M_{low} = 2.86$, $M_{high} = 2.83$) or *perceived mother caring*, $t(304) = 0.46$, $p = 0.64$ ($M_{low} = 2.87$, $M_{high} = 2.83$). However, there was a significant difference for *perceived mother trustworthiness*, $t(304) = 2.07$, $p = 0.04$ ($M_{low} = 2.80$, $M_{high} = 2.89$).

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Therefore, Hypothesis 1 was partially supported for the outcome variable *Sarah's*

likelihood to follow mother's recommendation. Participants were more likely to believe

that Sarah would follow the mother's recommendation when they perceived the mother

source to have higher trustworthiness, but they were not more likely to believe that Sarah

would follow the mother's recommendation due to perceived higher mother competence

or mother caring. In order to better see the distribution of scores, results in Table 5.11

(and Table 5.12) also present the percentage of participants who chose very unlikely,

somewhat unlikely, somewhat likely and very likely for likelihood to follow the

recommendation, situated within the high and low source credibility conditions.

  Source credibility and Sarah's likelihood to follow doctor's recommendation.

Results showed no significant differences for *perceived doctor competence*, $t(303) =$

0.20, $p = 0.84$ ($M_{low} = 2.91$, $M_{high} = 2.85$), *perceived doctor caring*, $t(303) = 0.62$, $p =$

0.54 ($M_{low} = 2.90$, $M_{high} = 2.81$), or *perceived doctor trustworthiness*, $t(303) = 0.56$, $p =$

0.57 ($M_{low} = 2.87$, $M_{high} = 2.86$). Therefore, Hypothesis 1 was not supported for the

outcome variable *Sarah's likelihood to follow the doctor's recommendation.* Participants

were not more likely to believe that Sarah would follow the doctor's recommendation

regardless of how they perceived the doctor's competence, caring, or trustworthiness.

Table 5.11
Hypothesis 1 Results for Source Credibility and Sarah's Likelihood

	Sarah's Likelihood to Follow Recommendation				
	Very unlikely	Somewhat unlikely	Somewhat likely	Very Likely	*p*-value
Mother	% *(n)*				
Competence					
Low *M* = 2.96 (*SD* = .69)	50% (4)	45.9% (45)	40.6% (54)	55.2% (37)	.42
High *M* = 4.95 (*SD* = .81)	50% (4)	54.1% (53)	59.4% (79)	44.8% (30)	

Table 5.11 (continued)

Caring					
Low M = 4.18 (SD = .86)	50% (4)	54.1% (53)	39.8% (53)	61.2% (41)	.64
High M = 6.25 (SD = .56)	50% (4)	45.9% (45)	60.2% (80)	38.8% (26)	
Trustworthiness					
Low M = 4.23 (SD = .71)	25.0% (2)	39.8% (39)	51.5% (68)	52.2% (35)	.04
High M = 6.19 (SD = .58)	75.0% (6)	60.2% (59)	48.5% (64)	47.8% (32)	
Doctor					
Competence					
Low M = 4.01 (SD = 1.04)	33.3% (3)	54.4% (49)	42.9% (60)	54.5% (36)	.84
High M = 6.52 (SD = .50)	66.7% (6)	45.6% (41)	57.1% (80)	45.5% (30)	
Caring					
Low M = 3.91 (SD = .71)	11.1% (1)	53.3% (48)	45.7% (64)	51.5% (34)	.54
High M = 5.93 (SD = .69)	88.9% (8)	46.7% (42)	54.3% (76)	48.5% (32)	
Trustworthiness					
Low M = 4.18 (SD = .74)	22.2% (2)	52.2% (47)	42.9% (60)	53.0% (35)	.57
High M = 6.28 (SD = .59)	77.8% (7)	47.8% (43)	57.1% (80)	47.0% (31)	

Source credibility and participant's likelihood to follow mother's

recommendation. Results showed significant differences for *perceived mother*

competence, t (306) = -3.58, $p < 0.001$ (M_{low} = 2.46, M_{high} = 2.84), *perceived mother*

caring, t (306) = -2.42, $p = 0.02$ (M_{low} = 2.51, M_{high} = 2.76), and *perceived mother*

trustworthiness, t (306) = 1.93, $p = 0.05$ (M_{low} = 2.49, M_{high} = 2.80). Participants were

more likely to follow the mother's recommendation when they perceived the mother

source to have higher competence, higher caring, and higher trustworthiness. Therefore,

Hypothesis 1 was fully supported for the outcome variable *participant's likelihood to*

follow mother's recommendation.

Source credibility and participant's likelihood to follow doctor's

recommendation. Results showed significant differences for *perceived doctor*

competence, t (305) = -3.57, p < 0.001 (M_{low} = 2.38, M_{high} = 2.80), *perceived doctor*

caring, t (305) = -2.85, p = 0.005 (M_{low} = 2.48, M_{high} = 2.78), and *perceived doctor*

trustworthiness, t (305) = -2.87, p = 0.004 (M_{low} = 2.46, M_{high} = 2.78). Participants were

more likely to follow the doctor's recommendation when they perceived the doctor

source to have higher competence, higher caring, and higher trustworthiness. Therefore,

Hypothesis 1 was fully supported for the outcome variable *participant's likelihood to*

follow doctor's recommendation.

Table 5.12
Hypothesis 1 Results for Source Credibility and Participant's Likelihood

	Participant's Likelihood to Follow Recommendation				
	Very unlikely	Somewhat unlikely	Somewhat likely	Very Likely	*p*-value
Mother					
Competence					
Low M = 2.96 (SD = .69)	54.1% (20)	58.0% (58)	41.3% (45)	29.0% (18)	0.001
High M = 4.95 (SD = .81)	45.9% (17)	42.0% (42)	58.7% (64)	71.0% (44)	
Caring					
Low M = 4.18 (SD = .86)	54.1% (20)	57.0% (57)	48.6% (53)	35.5% (22)	0.02
High M = 6.25 (SD = .56)	45.9% (17)	43.0% (43)	51.4% (56)	64.5% (40)	
Trustworthiness					
Low M = 4.23 (SD = .71)	37.8% (14)	41.4% (41)	54.1% (59)	51.6% (32)	0.05
High M = 6.19 (SD = .58)	62.2% (23)	58.6% (58)	45.9% (50)	48.4% (30)	
Doctor					
Competence					
Low M = 4.01 (SD = 1.04)	64.3% (27)	59.1% (52)	41.7% (50)	36.8% (21)	0.001
High M = 6.52 (SD = .50)	35.7% (15)	40.9% (36)	58.3% (70)	63.2% (36)	

Table 5.12 (continued)

Caring					
Low M = 3.91 (SD = .71)	54.8% (23)	59.1% (52)	45.8% (55)	33.3% (19)	0.005
High M = 5.93 (SD = .69)	45.2% (19)	40.9% (36)	54.2% (65)	66.7% (38)	
Trustworthiness					
Low M = 4.18 (SD = .74)	59.5% (25)	55.7% (49)	42.5% (51)	36.8% (21)	0.004
High M = 6.28 (SD = .59)	40.5% (17)	44.3% (39)	57.5% (69)	63.2% (36)	

Research Question 1

Research Question 1 asked which type of source credibility (competence, caring, trustworthiness) best predicts following the source's recommendation. Research Question 1 was answered using a multiple regression analysis. Because there were four dependent or criterion variables that need to be tested, four multiple regression analyses were run. The four dependent variables are *Sarah's likelihood to follow mother recommendation*, *Participant's likelihood to follow mother recommendation*, *Sarah's likelihood to follow doctor recommendation*, and *Participant's likelihood to follow doctor recommendation*. Due to high correlation between some of the source credibility predictor variables, all source credibility variables were mean-centered to reduce the risk of multi-collinearity in the regression analyses (Chatterjee & Hadi, 2006).

First, a multiple regression was performed on the dependent variable *Sarah's likelihood to follow mother recommendation* using the three mother source credibility predictor variables (*perceived mother competence, perceived mother caring, and perceived mother trustworthiness*). The model was not statistically significant, F (3, 302) = 0.23, $p = 0.87$, $R^2 = .002$. Therefore, the answer to Research Question 1 is that no type

of mother source credibility significantly predicts participant's perception of *Sarah's likelihood to follow mother recommendation*.

Second, a multiple regression was performed on the dependent variable *Participant's likelihood to follow mother recommendation* using the three mother source credibility predictor variables (*perceived mother competence, perceived mother caring, and perceived mother trustworthiness*). The model was statistically significant, F (3, 304) = 6.27, $p < .001$, $R^2 = .05$. One of the three predictor variables significantly predicted *participant's likelihood to follow mother recommendation: perceived mother competence* β = .19, $p = .02$. Therefore, the answer to Research Question 1 is that *perceived mother competence* is the only type of source credibility that significantly predicts *Participant's likelihood to follow mother recommendation*.

Third, a multiple regression was performed on the dependent variable *Sarah's likelihood to follow doctor recommendation* using the three doctor source credibility predictor variables (*perceived doctor competence, perceived doctor caring, and perceived doctor trustworthiness*). The model was not statistically significant, F (3, 301) = 0.99, $p = 0.40$, $R^2 = .01$. Therefore, the answer to Research Question 1 is that no type of doctor source credibility significantly predicts participant's perception of *Sarah's likelihood to follow doctor recommendation*.

Fourth, a multiple regression was performed on the dependent variable *Participant's likelihood to follow doctor recommendation* using the three doctor source credibility predictor variables (*perceived doctor competence, perceived doctor caring, and perceived doctor trustworthiness*). The model was statistically significant, F (3, 303) = 7.97, $p < .001$, $R^2 = .06$. However, only two of the three predictor variables were

significant predictors of *Participant's likelihood to follow doctor recommendation:*
perceived doctor competence $\beta = .23$, $p = .04$ and *perceived doctor caring* $\beta = .22$, $p =$
.048. Therefore, the answer to Research Question 1 is that *perceived doctor competence*
best predicts *Participant's likelihood to follow doctor recommendation*, followed by
perceived doctor caring.

Research Question 2

Research Question 2 asked what effect does past conversation with a source have
on participant's perceptions of source credibility. A one-way analysis of variance was
used to assess mean differences between perceptions of mother and doctor competence,
caring, and trustworthiness based on the types of past conversations participants had with
these sources (*past conversation recommending no vaccination, no past conversation,*
past conversation recommending vaccination).

Perceived mother credibility. A one-way ANOVA indicated no significant
differences in participants' ratings of *perceived mother competence* across the three
different past mother conversation scenarios, $F (2, 305) = 2.61$, $p = .075$, $\eta^2 = .02$. A
one-way ANOVA indicated a significant difference in participants' ratings of *perceived*
mother caring across the three different past conversation scenarios, $F (2, 305) = 4.95$, p
$= .008$, $\eta^2 = .03$. Specifically, LSD post hoc tests indicated that *past mother conversation*
recommending no vaccination ($M = 5.63$) differed significantly ($p = .05$) from *no past*
mother conversation ($M = 5.10$) and *past mother conversation recommending*
vaccination ($M = 5.12$). A one-way ANOVA indicated a significant difference in
participants' ratings of *perceived mother trustworthiness* across the three different past
conversation scenarios, $F (2, 305) = 6.74$, $p = .001$, $\eta^2 = .04$. Specifically, LSD post hoc

tests indicated that *past mother conversation recommending no vaccination* ($M = 5.61$)

differed significantly ($p = .05$) from *no past mother conversation* ($M = 5.04$) and *past*

mother conversation recommending vaccination ($M = 5.06$). Therefore, the answer to

Research Question 2 is that the type or nature of past conversation about HPV

vaccination with a mother or mother source affects participants' ratings of *perceived*

mother caring and *perceived mother trustworthiness*. Specifically, participants rated the

mother source in the message as more caring and more trustworthy if they personally had

a past conversation with their mother or mother figure in which she recommended against

vaccination than if they had a past conversation with their mother or mother figure in

which she recommended to get the vaccine or in situations in which the participants had

no past conversation with their mother or mother figure.

Perceived doctor credibility. A one-way ANOVA indicated significant

differences in participants' ratings of *perceived doctor competence* across the three past

conversation scenarios, $F (2, 303) = 3.53$, $p = .03$, $\eta^2 = .02$. Specifically, LSD post hoc

tests indicated that *past doctor conversation recommending no vaccination* ($M = 6.22$)

differed significantly ($p = .05$) from *no past doctor conversation* ($M = 5.28$). A one-way

ANOVA indicated a significant difference in participants' ratings of *perceived doctor*

caring across the three different past conversation scenarios, $F (2, 303) = 6.32$, $p = .002$,

$\eta^2 = .04$. Specifically, LSD post hoc tests indicated that *past doctor conversation*

recommending no vaccination ($M = 5.73$) differed significantly ($p = .05$) from *no past*

doctor conversation ($M = 4.67$) and *past doctor conversation recommending vaccination*

($M = 4.95$). A one-way ANOVA indicated a significant difference in participants' ratings

of *perceived doctor trustworthiness* across the three different past conversation scenarios,

$F(2, 303) = 4.97$, $p = .008$, $\eta^2 = .03$. Specifically, LSD post hoc tests indicated that *past doctor conversation recommending no vaccination* ($M = 6.07$) differed significantly ($p = .05$) from *no past doctor conversation* ($M = 5.08$) and *past doctor conversation recommending vaccination* ($M = 5.28$). Therefore, the answer to Research Question 2 is that the type or nature of past conversation with a doctor affects participants' ratings of *perceived doctor competence*, *perceived doctor caring*, and *perceived doctor trustworthiness*. Participants rated the doctor source in the message as more competent if they personally had a previous conversation with a doctor who recommended against vaccination than if they reported no past conversations with a doctor. Also, participants rated the doctor as more caring and more trustworthy if they personally had a past conversation with a doctor who recommended against vaccination than if they had a past conversation with their own doctor in which s/he recommended to get the vaccine or in situations in which the participants had no past conversation with a doctor.

Hypothesis 2

Hypothesis 2 predicted that messages with greater perceived argument strength will be positively related to participants' likelihood to follow the message recommendation. Hypothesis 2 was analyzed using zero-order correlation between each type of perceived argument strength and the likelihood to follow recommendation variables. Results are described in detail below and presented in Table 5.13 at the end of this section.

Participants' ratings of *Sarah's likelihood to follow mother recommendation* was positively correlated with *perceived mother long-term risk message argument strength*, $r(96) = .28$, $p < .01$. *Sarah's likelihood to follow mother recommendation* was not

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significantly correlated with *perceived mother short-term risk message argument strength* or *perceived mother no risk message argument strength*. Therefore, Hypothesis 2 is supported for the *perceived mother long-term risk message argument strength*: Participants who perceived the mother's long-term risk message as stronger were more likely to believe Sarah would follow the mother's recommendation.

The *participant's likelihood to follow mother recommendation* was positively correlated with *perceived mother short-term risk message argument strength*, $r(103) = .33, p < .01$ and *perceived mother long-term risk message argument strength*, $r(97) = .58, p < .01$, but was not significantly correlated with *perceived mother no risk message argument strength*. Therefore, Hypothesis 2 is supported for *perceived mother short-term risk message argument strength* and *perceived mother long-term risk message argument strength*: Participants who perceived the mother's short-term risk message and long-term risk messages as stronger were more likely to follow the mother's recommendation.

Participants' ratings of *Sarah's likelihood to follow doctor recommendation* was positively correlated with *perceived doctor long-term risk message argument strength*, $r(99) = .21, p < .05$, but were not significantly correlated with *perceived doctor short-term risk message argument strength* or *perceived doctor no risk message argument strength*. Therefore, Hypothesis 2 is supported for *perceived doctor long-term risk message argument strength*: Participants who perceived the doctor's long-term risk message as stronger were more likely to follow the doctor's recommendation.

The *participant's likelihood to follow doctor recommendation* was positively correlated with *perceived doctor short-term risk message argument strength*, $r(97) = .40,$

p < .01, *perceived doctor long-term risk message argument strength, r* (99) = .51, *p* < .01,

and *perceived doctor no risk message argument strength*, *r* (94) = .33, *p* < .01.

Therefore, Hypothesis 2 is supported for *perceived doctor short-term risk message*

argument strength, perceived doctor long-term risk message argument strength, and

perceived doctor no risk message argument strength: Participants who perceived all three

doctor messages as stronger were more likely to follow the doctor's recommendation.

Table 5.13
Hypothesis 2 Correlations between Likelihood and Argument Strength

	Mother short-term	Mother long-term	Mother no risk	Doctor short-term	Doctor long-term	Doctor no risk
Sarah's likelihood to follow mother recommendation	.057	.284**	-.061			
Participant's likelihood to follow mother recommendation	.329**	.582**	.127			
Sarah's likelihood to follow doctor recommendation				.149	.208*	-.105
Participant's likelihood to follow doctor recommendation				.398**	.506**	.332**

Note. **Correlation is significant at the 0.01 level; *Correlation is significant at the 0.05 level.

Hypothesis 3 and Research Question 3

Hypothesis 3 predicted that participants who receive messages from doctors and

mothers that converge on both recommendation and risk (i.e., Conditions 1, 5, 9) will be

more likely to follow the recommendation given by the doctor than participants who

receive messages from both sources with mixed message characteristics (divergence on

risk and convergence on recommendation; i.e., Conditions 7, 3) or divergent message

characteristics (divergence on both recommendation and risk; i.e., Conditions 2, 4, 6, 8).

In addition, Research Question 3 asked, what is the effect of past conversations with a source on likelihood to follow the doctor's recommendation? Hypothesis 3 and Research Question 3 were tested for the outcome variables Sarah's *likelihood to follow the doctor's recommendation* and *Participant's likelihood to follow the doctor's recommendation.* The decision was made to focus these final analyses on the participants' likelihood to follow a doctor's recommendation for two reasons: a) formative work revealed that doctors were more likely to voice pro-vaccination messages, and so focusing on likelihood to follow a doctor's recommendation is the most advantageous for promoting this behavior and b) the focus of future intervention efforts based on the findings from this study might more easily be directed toward doctors rather than mothers.

First, a 3 X 3 (*mother argument type* X *doctor argument type*) between-subjects univariate ANOVA tested the effects of the type of convergence on *Sarah's likelihood to follow the doctor's recommendation.* Past conversation with mother and past conversation with doctor were entered as covariates. Put simply, Hypothesis 3 predicted that messages that converge from both sources on both recommendation and risk will be more effective than mixed convergence messages, and that mixed convergence messages will be more effective than messages that diverge. Support for this hypothesis would be indicated by a significant *mother argument type* by *doctor argument type* interaction. The overall model was significant, $F(8, 305) = 10.70$, $p < .001$, $\eta^2 = .22$. More specifically, the two-way interaction term (*mother argument type* X *doctor argument type*) was statistically significant for *Sarah's likelihood to follow the doctor's recommendation*, $F(4, 305) = 15.03$, $p < .001$, $\eta^2 = .17$.

Post-hoc tests on individual mean differences for each message condition were not appropriate and would not provide a clear report of the mean differences *or* adequately address Hypothesis 3 because the conditions were grouped together in the hypothesis according to type of message convergence. Therefore, a follow-up one-way ANOVA on *Sarah's likelihood to follow the doctor's recommendation* was conducted across the three difference types of convergence (convergence on recommendation and risk, mixed convergence/divergence on recommendation and risk, divergence on recommendation and risk). This analysis was significant: F (2, 305) = 28.99, p <.001, η^2 = .16. Participants indicated that they more likely believed Sarah would follow the doctor's recommendation in message conditions where there was convergence on recommendation and risk (M = 3.21, SD = 0.79), followed by mixed message conditions (M = 3.03, SD = 0.78), and finally divergent message conditions (M = 2.52, SD = 0.64). LSD post-hoc tests on this analysis revealed that the message convergence conditions as a group were significantly greater (p = .05) than the divergent message conditions, and the mixed message conditions as a group were significantly greater (p = .05) than divergent message conditions. Therefore, Hypothesis 3 was nearly fully supported, except for the lack of a significant difference between convergence conditions and mixed conditions. Results for these analyses are displayed visually in Table 5.14 and Table 5.15.

Past conversations with both doctor and mother were entered as covariates in the model, and the analysis revealed that participants' perceptions of *Sarah's likelihood to follow the doctor's recommendation* did not vary in relation to past conversation with doctor or past conversation with mother or mother figure. Therefore, the answer to

Research Question 3 is no, past conversations with a mother or doctor about HPV

vaccination do not have an effect on participant's perceptions of *Sarah's likelihood to*

follow the doctor's recommendation.

Table 5.14
Sarah's Likelihood to Follow Doctor's Recommendation by Message Condition[a]

		Doctor		
		short term risk do not get vaccinated	*long term risk get vaccinated*	*no risk do not get vaccinated*
Mother	*short term risk do not get vaccinated*	1 Convergence on risk and recommendation $M = 3.30$[b] $SD = 0.84$	2 Divergence on risk and recommendation $M = 2.60$ $SD = 0.60$	3 Divergence on risk but convergence on recommendation $M = 2.94$ $SD = 0.80$
	long term risk get vaccinated	4 Divergence on risk and recommendation $M = 2.36$ $SD = 0.60$	5 Convergence on risk and recommendation $M = 3.26$ $SD = 0.71$	6 Divergence on risk and recommendation $M = 2.18$ $SD = 0.58$
	no risk do not get vaccinated	7 Divergence on risk but convergence on recommendation $M = 3.11$ $SD = 0.69$	8 Divergence on risk and recommendation $M = 2.91$ $SD = 0.57$	9 Convergence on risk and recommendation $M = 3.05$ $SD = 0.80$

Note. [a]The message conditions are shaded according to type of message convergence:

convergent message conditions are unshaded, mixed message conditions are shaded light

gray, and divergent message conditions are shaded dark gray. [b]The likelihood to follow

recommendation variable was measured on a 4-point scale, with higher scores indicating

a participant is more likely to follow the *doctor* recommendation.

Table 5.15
Sarah's Likelihood to Follow Doctor's Recommendation by Convergence Type

Convergence Type	Message Conditions	N	Mean	SD	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Converge on All	1 5 9	102	3.21	.79	3.05	3.36
Mixed	7 3	69	3.03	.75	2.85	3.21
Diverge on All	2 4 6 8	135	2.52	.64	2.41	2.63
Total		306	2.86	.78	2.77	2.95

Second, a 3 X 3 (*mother argument type* X *doctor argument type*) between-subjects univariate ANOVA tested the effects of the type of convergence on *Participant's likelihood to follow the doctor's recommendation.* Past conversation with mother and past conversation with doctor were entered as covariates. The overall model was significant, $F (8, 307) = 2.07, p < .05, \eta^2 = .05$. However, the two-way interaction term (*mother argument type* X *doctor argument type*) was not statistically significant. Similar to the process followed for the first outcome variable, a follow-up one-way ANOVA indicated significant differences on *Participant's likelihood to follow the doctor's recommendation* across the three difference types of convergence (convergence on recommendation and risk, mixed convergence/divergence on recommendation and risk, divergence on recommendation and risk), $F (2, 305) = 3.10, p <.05, \eta^2 = .02$. Participants indicated that they would be more likely to follow the doctor's recommendation in message conditions in which there was convergence on recommendation and risk ($M = 2.79, SD = 0.91$), followed by mixed message conditions ($M = 2.65, SD = 0.90$), and finally divergent message conditions ($M = 2.49, SD = 0.96$). LSD post-hoc tests on this analysis revealed that message convergence conditions as a group were significantly greater ($p = .05$) than divergent message conditions. Therefore, Hypothesis 3 was

partially supported. Results for these analyses are displayed visually in Table 5.16 and Table 5.17.

Past conversations with both doctor and mother were entered as covariates in the model, and the analysis revealed that participants' perceptions of *Participant's likelihood to follow the doctor's recommendation* did significantly vary in relation to past conversation with mother, $F(1, 305) = 10.27$, $p < .01$ Therefore, the answer to Research Question 3 is past conversations with a mother does have an effect on *Participant's likelihood to follow the doctor's recommendation*.

Figure 5.16
Participant's Likelihood to Follow Doctor's Recommendation by Message Condition [a]

		Doctor		
		short term risk do not get vaccinated	*long term risk get vaccinated*	*no risk do not get vaccinated*
Mother	*short term risk do not get vaccinated*	1 Convergence on risk and recommendation $M = 2.83$[b] $SD = 0.94$	2 Divergence on risk and recommendation $M = 2.63$ $SD = 0.88$	3 Divergence on risk but convergence on recommendation $M = 2.66$ $SD = 0.97$
	long term risk get vaccinated	4 Divergence on risk and recommendation $M = 2.35$ $SD = 1.01$	5 Convergence on risk and recommendation $M = 2.85$ $SD = 0.86$	6 Divergence on risk and recommendation $M = 2.15$ $SD = 0.94$
	no risk do not get vaccinated	7 Divergence on risk but convergence on recommendation $M = 2.65$ $SD = 0.85$	8 Divergence on risk and recommendation $M = 2.79$ $SD = 0.91$	9 Convergence on risk and recommendation $M = 2.69$ $SD = 0.96$

Note. [a]The message conditions are shaded according to type of message convergence: convergent message conditions are unshaded, mixed message conditions are shaded light gray, and divergent message conditions are shaded dark gray. [b]The likelihood to follow

recommendation variable was measured on a 4-point scale, with higher scores indicating

a participant is more likely to follow the *doctor* recommendation.

Table 5.17
Participant's Likelihood to Follow Doctor's Recommendation by Convergence Type

Convergence Type	Message Conditions	N	Mean	*SD*	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Converge on All	1 5 9	103	2.79	.91	2.61	2.97
Mixed	7 3	69	2.65	.90	2.43	2.87
Diverge on All	2 4 6 8	136	2.49	.96	2.32	2.65
Total		308	2.62	.94	2.52	2.73

CHAPTER 6

Discussion

The purpose of Study 2 was to provide an experimental test of the MCF in the context of HPV vaccination. This was the first empirical test of the MCF, and the results provide support for the main tenets of the theory. Specifically, in Study 2, participants heard messages from both a mother source and a doctor source; these two messages converged on the type of risk message and recommendation provided, diverged on the type of risk message and recommendation provided, or were mixed in the type of risk message and recommendation provided. Participants were then asked to indicate their perceptions of each source's credibility, their perceptions of the strengths of each argument (i.e., message), and finally, their likelihood and their perceptions of Sarah's likelihood to follow each source's recommendation. In this discussion chapter, I first discuss some of the major implications of Study 2 findings. Next, I discuss the limitations of Study 2 including methodological and external validity considerations. Finally, I conclude the chapter with some ideas for future research and health interventions.

Implications

The goal of this study was to answer three hypotheses and three research questions that explored the persuasive effects of perceptions of source credibility, perceptions of argument strength, and the effect of different types of message convergence. The data presented in Chapter 5 provide some evidentiary support to address these hypotheses and research questions. To address the findings that were concordant and discordant with the hypotheses and research questions, the following sections examine in detail four main discussion points or implications.

First, the main outcomes in this study were participants' perceptions of Sarah's

likelihood to follow recommendations from the doctor and mother source and

participants personal likelihood to follow recommendations from the doctor and mother

source. There were some key differences between participants' responses to Sarah's

likelihood to follow a recommendation and their personal likelihood to follow a

recommendation. To address these differences, I first describe the overall findings for

Sarah's likelihood to follow a recommendation and reserve the remainder of the

discussion section to focus on participants' personal likelihood outcome variables. Table

6.1 offers detail to the reader of each hypothesis or research question, and the findings for

each outcome variable (Sarah's likelihood to follow a recommendation and participant's

likelihood to follow a recommendation).

Recall Hypothesis 1 predicted that participants would more likely follow the

recommendation given by sources they perceive as higher in

credibility/caring/trustworthiness than sources they perceive as lower in

credibility/caring/trustworthiness, Research Question 1 asked which type of source

credibility (competence, caring, trustworthiness) best predicts following the source's

recommendation, and Hypothesis 2 predicted that messages with greater perceived

argument strength will be positively related to participants' likelihood to follow the

message recommendation. Results show that both source credibility and argument

strength did not have significant main effects (with some minor exceptions) on

participants' ratings of Sarah's likelihood to follow recommendations. This may suggest

that, in evaluations of what an "other" would do, certain cues like source credibility and

argument strength are not important message processing variables for individuals. In

other words, in terms of the ELM, participants are not relying on perceptions of higher source credibility or perceptions of stronger arguments as reasons for another person to follow a source's recommendation.

Alternatively, these data indicate participants' ratings of Sarah's likelihood to follow a source's recommendation were almost fully explained by message convergence. There were significant differences between message convergent and divergent conditions and between mixed message conditions and divergent message conditions and these differences were in the hypothesized direction. It may be that, in the case of evaluating what an "other" would do, the message convergence acted as a processing cue for participants, such that when messages converged, participants assumed that Sarah would follow the doctor's recommendation because it agreed with the mother's risk message and recommendation. Compared to convergent and mixed message conditions in which scores were at or above 3.0, in message divergent conditions (see Figure 5.1 in Chapter 5), participants' scores on Sarah's likelihood to follow the doctor recommendation generally hovered around the 2.5 mark on the 4-point scale; this suggests "neutral territory" in that participants' average scores were in the mid-point of the scale. This may indicate uncertainty in what Sarah would be likely to do, suggesting that divergent conditions do create a level of dissonance for participants. An alternate explanation is that such uncertainty was not due to dissonance, but rather the inability for participants to evaluate which message source would be more compelling for Sarah in the context of divergent recommendations. However, this idea needs to be further explored.

Table 6.1

Sarah and Participant Comparison of Findings

Hypothesis/Research Question	Test	[a] Sarah	[b] Participant
H1a: Young women will be more likely to follow mother recommendation if perceived higher credibility.	*t*-test	*Partially supported* Higher trustworthiness predicts more likely to follow.	*Fully supported* Higher competence, caring, and trustworthiness predict more likely to follow.
H1b: Young women will be more likely to follow doctor recommendation if perceived higher credibility.	*t*-test	*Not supported*	*Fully supported* Higher competence, caring, and trustworthiness predict more likely to follow.
RQ1a: Which type of source credibility best predicts following mother's recommendation?	Multiple Regression	*Not able to answer/Model not significant*	Perceived mother competence is only significant predictor
RQ1b: Which type of source credibility best predicts following doctor's recommendation?	Multiple Regression	*Not able to answer/Model not significant*	Perceived doctor competence and perceived doctor caring significant predictors
RQ2a: What is the effect of past conversations with mother on perceived mother credibility?	One-way ANOVA	N/A	Perceived mother caring and perceived mother trustworthiness higher if past conversation recommended no vaccine.
RQ2b: What is the effect of past conversations with doctor on perceived doctor credibility?	One-way ANOVA	N/A	Perceived doctor competence, caring, and trustworthiness higher if past conversation recommended no vaccine

Table 6.1 (continued)

H2a: Young women will be more likely to follow mother's recommendations in messages perceived as strong.	Bivariate correlation	*Partially supported* Participants more likely to follow recommendation in stronger long-term risk message, but not in other message conditions	*Partially supported* Participants more likely to follow recommendations in stronger short-term and stronger long-term risk message, but not in no risk message condition
H2a: Young women will be more likely to follow doctor's recommendations in messages perceived as strong.	Bivariate correlation	*Partially supported* Participants more likely to follow recommendation in stronger long-term risk message	*Fully supported* Participants more likely to follow recommendations in (all) arguments they perceive as stronger
H3: Young women will follow doctor's recommendation more in convergent message conditions than in mixed and more in mixed conditions than in divergent conditions.	Univariate ANOVA	[c]*Nearly Fully Supported* Participants followed recommendations more in convergent conditions than in mixed conditions and divergent conditions	*Partially Supported* Participants followed recommendations more in convergent conditions than in divergent conditions
RQ3: What is the effect of past conversations with a source on likelihood to follow doctor's recommendation?	Entered as Covariates in ANOVA	*Not able to answer/Not significant covariates*	Past conversations with mother has an effect on participant's likelihood to follow doctor's recommendation

Note [a] The Sarah column represents the outcome Sarah's likelihood to follow a recommendation. [b] The Participant column represents the outcome Participant's likelihood to follow a recommendation. [c] Please see Chapter 5 Results section for a detailed description of why these hypotheses are labeled "nearly fully supported;" space limitations in the table prevent a thorough description.

Second, source credibility and argument strength proved important predictors of participants' personal likelihood to follow a source's recommendation. Participants were more likely to follow a source's recommendation (both mother and doctor) when they perceived the source to be more competent, caring, and trustworthy, and when they perceived the argument the source was making to be strong. However, recall that individuals read messages from both sources at the same time and therefore it may be unclear what role source credibility and argument strength played in how individuals processed these messages. In past message testing studies, it has been typical for participants to read a message from one source and then evaluate that individual source's credibility (Stiff & Mongeau, 2003). By asking participants to read messages from two sources at the same time and then evaluate each source's credibility, it may be that participants made comparisons in their mind that also reflected upon their credibility assessments. Did these source variables act as peripheral cues, such that a more credible source acted as a cue for a participant to follow that recommendation rather than a less credible source?

Alternatively, given that individuals read messages from both sources at the same time, did source credibility prompt individuals to centrally process the source attributes? Past research says that while source credibility typically serves as a peripheral cue, it can act as a central cue in some instances in which source credibility is important in the decision (O'Keefe, 2002). I would posit that in cases in which two sources are "pitted" against each other, like what was done in Study 2, source credibility serves more as a central processing cue. However, future research needs to examine this idea using measures such as thought listing tasks that assess central processing. Additionally, the

role of argument strength, often relied on as an indicator of central processing, needs

further examining in the context of multiple messages. Even if it is true that an

individual believes a message is strong (and the source is credible), she may still choose

not to follow the recommendation given by that particular source if she is confronted with

a message and recommendation from another source that is also argumentatively strong

and credible.

Third, recall that Research Question 2 asked what effect does past conversation

with a source have on participant's perceptions of source credibility. Results revealed

that past conversations with a source had an effect on a participant's perceptions of

source credibility and likelihood to follow a recommendation from that "same" source.

In other words, *past conversations about HPV vaccination matter*, lending support to the

notion that the communication environment around an issue (e.g., HPV vaccination)

should be seen more as a movie reel and not a snapshot of one point in time.

Specifically, the *type* of past conversation revealed that participants reacted to messages

from a similar source (in this case, *Sarah*'s mother and doctor) in different ways. By

that, I mean that participants perceived a source's credibility in different ways depending

on their past communication with a source. For example, the mother source (regardless

of message condition) was perceived as more caring and more trustworthy if the

participant had personally discussed HPV vaccination with her mother in the past and the

mother had recommended against vaccination, than if participants had past conversations

in which the participant's mother had recommended for vaccination or if no past

conversations had occurred. It is unclear why this is the case. However, one possible

explanation can be drawn from the study sample itself. Because the women in the study

were unvaccinated, if the participants had personally discussed HPV vaccination in the past, she clearly had considered vaccination and chosen not to vaccinate. In asking participants to consider the credibility of the mother source in the scenario, it may be that participants considered mothers who chose to discuss vaccination with their daughters, even though this was a hypothetical scenario with "Sarah's" mother, as more caring and trustworthy because they cared enough to talk about it. After all, this finding was significant regardless of the recommendation in the message scenarios (i.e., the mother recommending to get the vaccine or recommending not to get the vaccine).

The same pattern was seen for past conversations with a doctor; the doctor source in this experiment was perceived as more competent, more caring, and more trustworthy if a participant had personally discussed HPV vaccination with her own doctor in the past and that doctor had recommended against vaccination. In the case of doctors, the same possible explanation for mothers may be at play. In sum, this study revealed that past conversations with a source do have an impact on a person's processing of current messages, lending support to the idea that individuals process current risk messages through a personal frame of reference (Sellnow, Ulmer, Seeger, & Littlefield, 2009). This frame of reference includes an individual's past exposure to messages about the topic whether from the same or a similar source. However, future research is needed to further examine the effect of past communication about a health topic on an individuals' processing of current communication about the same topic.

Fourth, this first test of the message convergence framework revealed support for the model. The model's main proposition, that message convergence by multiple sources will lead participants to be more persuaded to follow the recommendation, now has

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empirical support. There are a variety of cognitive functions that may be at work to explain why convergence provides the strongest behavioral intention effect. For example, in the case of likelihood to follow a doctor's recommendation in Study 2, participants may have seen the mother's message as reinforcing what the doctor was saying and therefore felt more assured that the behavior the doctor was advocating was indeed possible. Alternatively, much like participants' ratings of Sarah's likelihood to follow the doctor's recommendation in divergent message conditions, participants' average scores on their likelihood to follow the doctor's recommendation in divergent conditions were in the 2.15-2.79 range, suggesting a potential level of uncertainty in whether they should follow the recommendation. This was also the case in mixed message conditions; participants' scores ranged from 2.65-2.66. Recall that in these "mixed" conditions, participants read messages that diverged on the *type* of risk (i.e., the short term risk of getting the vaccine or the lack of risk of becoming infected with HPV) but converged on recommendation (i.e., do not get vaccinated). Despite the fact that there wasn't a significant difference between convergent and mixed conditions or divergent and mixed conditions on this outcome variable, mean directions suggest that the mixed message conditions do fall between convergent and divergent conditions. This may be the most interesting finding and one that needs further exploration – a convergent recommendation is not the only part of the message that's important – participants may also need a convergent message (or argument) for why they should follow this convergent recommendation.

Limitations

There were many limitations to Study 2 that deserve attention and that readers should be aware of as they consider the results of this project. I will organize the limitations around experimental design, measurement and related data analysis issues, and finally, external validity threats.

First, perhaps the most difficult part of designing Study 2 was identifying how to test the MCF. This was the first test of MCF and there was little guidance in the research literature for designing an experiment like this one. The experimental design used in this message testing study was somewhat unusual compared to other persuasive health message testing studies in three ways. First, even though several of the hypotheses and research questions concerned the effect of each source (i.e., mother and healthcare provider), in every message condition, the participants read messages from both sources. In other words, source was not a manipulated variable in the factorial design but it was an IV of interest. Second, and related, the message manipulation came in the form of type of argument (3 levels; short term risk of vaccine, long term risk of cervical cancer, and lack of risk) and the type of recommendation (2 levels; recommends get the vaccine, recommends against vaccination) from each source. However, in the manipulation of the second independent variable (type of recommendation), it was necessary to expose participants to the negative recommendation in more than one experimental condition (i.e., participants read a negative recommendation in both short term risk argument and lack of risk argument). Because of this, a true factorial design was not possible because one of the IVs (recommendation type) was represented in more than one "column" of the message matrix usually associated with a factorial design. See Table 5.4 for a visual

depiction of these message conditions. Related, the type of risk messages tested in this study differed in terms of the locus of risk (i.e., risk of the vaccine, risk of cervical cancer, and lack of risk for contracting HPV); this is something that could have been addressed in a more sensitive manner in the data analysis in order to control for these differences. Third, the main hypothesis concerning the experimental message testing concerned the convergence/divergence of messages in each experimental condition and not the usual main or interaction effects of individual or combined IVs, thus further making a test of this true factorial design not necessary. Despite these unusual conditions, I believe that this experimental design *did* allow for an adequate first test of the message convergence framework. Future research should attempt to conduct more sophisticated tests of the model.

Second, because of little guidance in the published literature on research design, the data analysis required some extra work, such as recoding a number of variables and creating a number of variables after data collection occurred in order to fully address the research questions and hypotheses. For example, in most if not all persuasion and health behavior change research, the outcome variable is behavioral intention to *adopt the behavior*. Here, this study design initially used a behavioral intention outcome measure (i.e., intention to vaccinate), which is common in vaccination studies. However, the true outcome in message convergence research should be likelihood or intention to *follow a message recommendation*, whatever that may be. Therefore, the vaccination intention measure that participants answered had to be recoded into a likelihood to follow the recommendation measure.

Related, I could have conducted more sophisticated analyses on source credibility, argument strength, and the role of past communication about HPV vaccination. For example, participants' past conversations about HPV vaccination with both their own mothers and their own healthcare providers was measured and each individual's past conversation types (i.e., type of past conversation with a mother, type of past conversation with a doctor) were entered as covariates in the ANOVA testing the different message conditions on likelihood to follow the doctor's recommendation outcome. However, a combined variable reflecting whether the type of past conversation with a mother converged or diverged with the type of past conversation with a doctor may have been a more interesting covariate to test in the model. Additionally, measuring more than just past communication with these two sources and their effect on participants' message processing may have provided a more fitting test of the MCF, which seeks to consider all possible communication about a topic. Despite this, the number of participants in this study limited the feasibility of testing interactions among many covariates and I made the decision instead to test the main propositions in the model (i.e., convergence or divergence among two sources) at the expense of these more detailed nuances (i.e., the effect of a more thorough examination of past communication on message processing). Future work should strive to investigate important covariates, as informed by formative work around the behavior of interest.

Related, there were also a number of measurement limitations. First, two of the variables measured in this study may have lacked a strong conceptual fit. As previously mentioned, the main outcome variable (likelihood to follow a recommendation) was recoded from a vaccine behavioral intention measure. In addition, the past conversation

measure only measured the type of past conversation (*no past conversation, past conversation recommending no vaccination, and past conversation recommending vaccination*). This suggests that participants only had *one* past conversation with each of these sources and therefore this measure did not capture the extent of past conversation (e.g., one conversation, multiple conversations), nor did it measure the quality of the conversation (e.g., whether the source was deemed credible, whether participants believed the argument was strong). The measure also failed to include other sources of past conversations or communication about HPV vaccination (which were identified in Study 1). Additionally, to simplify the study design, only the two most important sources identified in Study 1 for HPV vaccination information (i.e., mother and doctor) were tested in Study 2.

There also may have been a number of potentially important variables that were not measured, and therefore I was unable to see if they made a significant difference in an individual's processing of HPV vaccination messages. For example, a participant's personal sexual history could have had an impact on her processing of the messages she received in the experimental scenario, which identified that Sarah was not a virgin but that her mother and doctor (the sources of the messages for the experiment) did not know this. In fact, one of the messages that participants received from the doctor and/or mother concerned the lack of risk of contracting HPV because the source believed that Sarah was a virgin. Other important variables of interest to this study that were not measured and/or not included in analyses include attitudes and beliefs about vaccinations in general, other cervical cancer-related behaviors like Pap testing and HPV testing history, geographic location of participants (as well as where they grew up, if it is different from their current

location), religious and political beliefs, and family communication norms (which may reveal why a participant would follow a family member's recommendation more than a non-family member like a doctor). In addition, there may have been other important covariates that may have proven important if they had been included in the study and future research, including more formative work on what variables may be important to include, is needed.

Finally, given the applied nature of this research project, I would be remiss to not discuss external validity considerations. The sample for Study 2 was young adult unvaccinated women from Kentucky, which limits the generalizability of the findings beyond this population. However, there are also several strengths to this sample. First, the formative work completed in Study 1, which informed the experimental messages in Study 2, was conducted with a similar sample (young adult unvaccinated women from Kentucky); therefore the findings are highly generalizable to this particular population. Second, and related, both studies used unvaccinated women, which would be a relevant target population for any HPV vaccination uptake intervention. Third, the geographic focus in Kentucky is important given the previously discussed high cervical cancer rates and relatively low HPV vaccination rates. Another external validity consideration is the medium used in this message testing study. The stimulus was text-based. A more realistic test may have been to use video messages of each source delivering a message. However, the text-based messages allowed for the study to be easily completed on the Internet and it also allowed for participants to be reminded of the source and message when answering each question (i.e., as a reminder, participants saw the "mother" message

at the top of the screen while they filled out the mother source credibility and mother argument strength measures; the same held true for the "doctor" message).

Future Directions

There are two areas for future research with regard to this study. The first is in regard to research and intervention design for increasing HPV vaccination among young adult women. The findings from Study 2 reveal important information about how messages from different sources have an effect on likelihood to receive the HPV vaccine. While single-source and single-message research is valuable in helping us understand communication influences, this study reveals that researchers need to move beyond single message research designs to consider multiple communication influences. Perhaps the most important piece of information that was learned (or, confirmed) in this study is that recommendations for health behaviors do not happen in a vacuum. Moving forward, developing more sensitive understandings of these multiple recommendations and teaching healthcare providers how to talk to patients will help us to better increase HPV vaccine uptake. Elder, Ayala, and Harris (1999) suggest a number of provider counseling actions informed by health behavior change theories, including having the provider "elicit from the patient potential cues he/she is exposed to on a daily basis" such as media messages as well as "determine whether family members and friends endorse the behavior [and]… highlight these endorsements if they exist" (p. 278). In this way, healthcare providers can capitalize on message convergence being an effective method of behavior change and work to help the patient "see" the message convergence in their communication environment.

However, in cases in which patients may be receiving conflicting or divergent messages and recommendations (or, alternatively, *no* messages) from others in their communication environment, the provider's actions for encouraging vaccination are less clear. Despite this, healthcare providers cannot know a patient's history with regard to HPV vaccination communication unless they elicit that information from the patient. Perhaps starting the HPV vaccination conversation by simply asking "what have you heard about this vaccine?" is a good first step in opening up the dialogue and learning what patients have heard. Such a conversation will help healthcare providers better assess what past messages a patient has received. This is especially relevant to the population of young adult women, who may still be influenced by their mother and other family members when it comes to health, even though they are over 18 and are most likely making independent health decisions. For example, healthcare providers can enlist the use of others in the patient's life to encourage behavior change. Elder, Ayala, and Harris (1999) note that "support for change can be elicited from family members or close friends" and doctors can "invite key family members into a discussion with the patient" to help reinforce the benefits of behavior change (p. 280).

The second major implication for future research is that this framework (MCF) *and* this research design (examining the effect of more than one persuasive message) should be tested in other health communication contexts. Given the significant findings shown here, it is reasonable to assume that other "controversial" health behaviors may benefit from a message convergence framework analysis. For example, consider the topic of voluntary mastectomies due to testing positive for the BRCA gene. Angelina Jolie made national headlines when she shared her personal story around this decision

(Jolie, 2013), but it's something that thousands of women may deal with at some point in their lives. This is a behavior for which there may be multiple messages about the topic – some encouraging, some discouraging – and better understanding how a woman sorts through these messages can allow health communication scholars to better design messages and social support programs for women who find themselves in a similar situation. Another health topic that may benefit from this analysis is breast feeding. While this is a decision that is easy for some women, others may find it difficult to decide to breast feed (or decide to *continue* to breast feed) due to the messages they receive about this behavior from spouses, parents, in-laws, peers, rude people in public, etc. Surprisingly, there is little published communication research on the discourse around breastfeeding (Foss, 2013; Gray, 2013). In sum, while it is clear that these two research ideas center specifically on women's health (a personal research bias, I admit!), *any* health behavior in which an individual may receive conflicting messages from different sources over time about what to do regarding a health issue is a ripe area for study from this framework.

Conclusion

The purpose of this research project was to better understand the communication environment about HPV vaccination and how multiple messages from different sources interact to influence HPV vaccination decisions. The project contained two studies. In Study 1, the message convergence framework was used to analyze interviews with unvaccinated young adult women who discussed past messages they received about HPV vaccination and the effect those messages had on their HPV vaccine decision. In Study 2, the findings from Study 1 were used to design an experiment to test these typical

messages and message sources and determine in which conditions (convergence, divergence, or mixed) a participant was more likely to follow a recommendation. In sum, this research project succeeded in achieving its objectives. We now have a clearer idea of what the HPV vaccination communication environment "looks" like for young adult women, and we have a better understanding of how multiple HPV vaccination messages influence decision-making.

Consent to Participate in a Research Study

Understanding Patient Perspectives on Cervical Cancer Prevention

WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?

You are being invited to take part in a research study about your perspectives on cervical cancer prevention. You are being invited to take part in this research study because you are a female between the ages of 18 and 30 years old. If you choose to take part in this study, you will be one of about 300 women to do so in the Lexington area.

 WHO IS DOING THE STUDY?

The person in charge of this study is Katharine Head (Principal Investigator, PI) of the University of Kentucky's Department of Communication. She is a doctoral student and is being guided in this research by Dr. Elisia Cohen.

WHAT IS THE PURPOSE OF THIS STUDY?

This research study will help Katharine better understand young adult women's perspectives on cervical cancer prevention. All answers to your questions will be kept confidential. In addition, you understand that all information from the study will be used only for research purposes. Although you may not get personal benefit from taking part in this research study, your responses may help us understand more about how young women like you communicate about cervical cancer prevention.

ARE THERE REASONS YOU SHOULD NOT TAKE PART IN THIS STUDY?

If you are under 18 years of age or over 30 years of age you will not be able to participate in this study. There are questions of a sensitive nature included in the study, mostly about issues related to women's health and wellbeing. Your responses will be kept confidential. Although we have tried to minimize the number of sensitive questions that we ask, some questions may make you upset or feel uncomfortable or embarrassed, and you may choose not to answer them. If some questions do upset you, we can tell you about some people who may be able to help you with these feelings.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

You will need to complete one web-based survey for the study which will take approximately 15-20 minutes to complete. This survey will be completed at your convenience on a computer.

WHAT WILL YOU BE ASKED TO DO?

You will be asked to answer questions on a web-based survey (on the computer). These questions will ask about your knowledge, thoughts, and feelings about cervical cancer prevention and women's health. As part of the survey, you will also be asked to respond to a scenario about cervical cancer prevention. You will complete this survey at your own convenience (for example, on your home computer). After reading this informed consent statement and agreeing to participate in the study, you can proceed to completing this web-based survey.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

To the best of our knowledge, the things you will be doing have no more risk of harm than you would experience in everyday life. The only possible risks to you are any discomfort or embarrassment you might feel answering some of the survey questions. If so, we can tell you about some people who may be able to help you with these feelings. However, this risk should be no greater than what you would experience in everyday conversations with other people such as yourself about these issues. In addition to the risks listed above, you may experience a previously unknown risk or side effect.

WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

There is no guarantee that you will get any benefit from taking part in this study. However, some people have experienced increased knowledge and understanding about cervical cancer prevention and women's health after participating in similar studies. Your willingness to take part, however, may in the future help society as a whole better understand this research topic.

DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You have a choice about whether or not to complete the survey, and if you do participate, you are free to skip any questions or discontinue at any time. As a student, if you decide not to take part in this study, you may want to choose to participate in other research projects to fulfill course requirements.

IF YOU DON'T WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

If you do not want to take part in this research study, you can withdraw from the study. Participants who signed up for this study to earn Communication research credit for their Communication course(s) can choose to earn their required research credit by signing up for other research projects offered by the Department of Communication.

WHAT WILL IT COST YOU TO PARTICIPATE?

There are no direct costs associated with taking part in the study.

WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

For students enrolled in lower level Communication courses and who signed up as part of the SONA Research Recruitment System, you will receive course credit for participating. Specifically, you will receive one (1) research credit. This credit will be granted to you at the conclusion of your participation. For participants who signed up as a volunteer to participate in this study, you will receive a $10 gift card to the business of your choice (Target or Starbucks) for participation in this study.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?

We will make every effort to keep private all research records that identify you to the extent allowed by law. We may be required to show some study information, such as information that identifies you, to people who need to be sure we have done the research correctly. These would be people from such organizations as the University of Kentucky.

Your name will not be attached to any of the materials that you complete during the study. Please be aware, while we make every effort to safeguard your data once received from the online survey/data gathering company, given the nature of online surveys, as with anything involving the Internet, we can never guarantee the confidentiality of the data while still on the survey/data gathering company's servers, or while en route to either them or us. It is also possible the raw data collected for research purposes may be used for marketing or reporting purposes by the survey/data gathering company after the research is concluded, depending on the company's Terms of Service and Privacy policies.

Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be personally identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private as it will not be linked to your responses. This study is confidential.   However, it should be noted that researchers can be forced by law to tell people who are not connected with the study, including the courts, about your participation.

CAN YOUR PARTICIPATION IN THE STUDY END EARLY?

If you decide to take part in the study, you still have the right to decide at any time that you no longer want to continue. You also may skip any question that you do not wish to answer. You will not be treated differently if you decide to skip questions or stop taking part in the study.

WHAT IF YOU HAVE QUESTIONS, SUGGESTIONS, CONCERNS, OR
COMPLAINTS?

Before you decide whether to accept this invitation to take part in the study, please ask
any questions (by contacting Katharine Head through email at katharine.head@uky.edu)
that might come to mind now. Later, if you have questions, suggestions, concerns, or
complaints about the study, you can contact the investigator, Katharine Head, at
katharine.head@uky.edu. If you have any questions about your rights as a volunteer in
this research, contact the staff in the Office of Research Integrity at the University of
Kentucky at 859-257-9428 or toll free at 1-866-400-9428. Thank you in advance for
your assistance with this important project.

IMPLIED CONSENT

Below, please select "Continue" if you would like to complete the survey. By choosing to
complete the web-based survey, you are providing implied consent to participate in the
research project. You may print this consent form for your records or the researcher will
provide a paper copy for you at your request.

Experimental Survey

Internet Survey Questions

Note: Questions include the variable label (*Gender*), followed by the question/directions that were given to the participant for that question (*What is your gender?*), followed by the answer choices as well as what value each variable level was given (*1 = Male, 2 = Female*). A link to login to the actual online survey, which may provide a better understanding of the flow of the survey, can be provided upon request.

Gender What is your gender?
○ Male (1)
○ Female (2)

ClgClass What is your college classification?
○ Freshman (1)
○ Sophomore (2)
○ Junior (3)
○ Senior (4)
○ Graduate Student (5)
○ Does not apply (6)

Race What is your race?
○ White/Caucasian (1)
○ African American (2)
○ Hispanic (3)
○ Asian (4)
○ Native American (5)
○ Pacific Islander (6)
○ Other (7)

Age How old are you?
○ 17 or younger (17)
○ 18 (18)
○ 19 (19)
○ 20 (20)
○ 21 (21)
○ 22 (22)
○ 23 (23)
○ 24 (24)
○ 25 (25)

○ 26 (26)
○ 27 (27)
○ 28 (28)
○ 29 (29)
○ 30 (30)
○ 31 or older (31)

RcvdHPVvac Have you received the HPV vaccine?
○ Yes (1)
○ No (2)
(If yes, participant proceeds to page 3; if no, participant proceeds to page 5.)

[If yes, received HPV vaccine…]

Howmany How many doses (shots) of the HPV vaccine have you received?
- ○ One dose (1)
- ○ Two doses (2)
- ○ Three doses (3)

Age1stdose At what age did you receive the first dose (shot) of the HPV vaccine?
- ○ Under 10 (10)
- ○ 11 (11)
- ○ 12 (12)
- ○ 13 (13)
- ○ 14 (14)
- ○ 15 (15)
- ○ 16 (16)
- ○ 17 (17)
- ○ 18 (18)
- ○ 19 (19)
- ○ 20 (20)
- ○ 21 (21)
- ○ 22 (22)
- ○ 23 (23)
- ○ 24 (24)
- ○ 25 (25)
- ○ 26 (26)

HS1stdose Were you in high school when you received the first dose (shot) of the HPV vaccine?
- ○ Yes (1)
- ○ No (2)

LivSit What was your living situation when you received the first dose (shot) of the HPV vaccine?
- ○ Living at home with parents (1)
- ○ Living away from home (2)
- ○ Other (please explain): (3) _____

Hlthcre1st At the time you received the first dose (shot) of the HPV vaccine, what type of healthcare program or payment type did you use?
- ○ Private insurance (for example, your parent's insurance) (1)
- ○ Private pay (for example, paying for health services like the vaccine on your own) (2)
- ○ Public assistance (for example, Medicaid or the Vaccines For Children [VFC] program) (3)
- ○ Other (please explain): (4) _____

○ Don't know (5)

HlthcreNOW What type of healthcare program or payment type do you use now?
○ Private insurance (for example, your parent's insurance) (1)
○ Private pay (for example, paying for health services like the vaccine on your own) (2)
○ Public assistance (for example, Medicaid or the Vaccines For Children [VFC] program) (3)
○ Other (please explain): (4) _____
○ Don't know (5)

HPVBelfs What are your general thoughts on the HPV vaccine?

	Strongly Disagree (1)	Somewhat Disagree (2)	Somewhat Agree (3)	Strongly Agree (4)
The HPV vaccine might cause short term problems, like fever. (1)	○	○	○	○
The HPV vaccine might cause short term problems, like pain at the injection site. (2)	○	○	○	○
The HPV vaccine might cause short term problems, like a rash. (3)	○	○	○	○
The HPV vaccine is being pushed to make money for drug companies. (4)	○	○	○	○
The HPV vaccine might cause long-lasting health problems that we don't yet know about. (5)	○	○	○	○
If a teenage girl gets the HPV vaccine, she may be more likely to have sex. (6)	○	○	○	○
I think the HPV vaccine is unsafe. (7)	○	○	○	○
Teenage girls are too young to get a vaccine for a sexually transmitted	○	○	○	○

	disease like HPV. (8)				

HPVEffect

	Slightly Effective (1)	Moderately Effective (2)	Very Effective (3)	Extremely Effective (4)
How effective do you think the HPV vaccine is in preventing an HPV infection? (1)	❍	❍	❍	❍
How effective do you think the HPV vaccine is in preventing cervical cancer? (2)	❍	❍	❍	❍

[Participants who answered yes to receiving HPV vaccine finish the survey at this point.]

CnvDoc Have you ever discussed HPV vaccination with a healthcare provider?
❍ Yes (1)
❍ No (2)
[If yes, participant proceeds to next two questions; if no, participant skips next two questions.]

RecDoc Did the provider...
❍ Recommend that you receive the HPV vaccine. (1)
❍ Recommend that you not receive the HPV vaccine. (2)

InfoDoc What types of information did the healthcare provider tell you about the vaccine? Please describe.

CnvMom Have you ever discussed HPV vaccination with your mom or a mother figure in your life?
❍ Yes (1)
❍ No (2)
[If yes, participant proceeds to next two questions; if no, participant skips next two questions.]

RecMom Did your mom (or mother figure)...

○ Recommend that you receive the HPV vaccine. (1)
○ Recommend that you not receive the HPV vaccine. (2)

InfoMom What types of information did your mom (or mother figure) tell you about the vaccine? Please describe.

BlfsGetVc1 Please indicate how much you agree or disagree with the following statements about getting the HPV vaccine

	Strongly Disagree (1)	Somewhat Disagree (2)	Somewhat Agree (3)	Strongly Agree (4)
I absolutely will not get the HPV vaccine. (1)	○	○	○	○
I would consider getting the HPV vaccine if I had more information about it. (2)	○	○	○	○
I would get the HPV vaccine if it wasn't so expensive. (3)	○	○	○	○
I would get the HPV vaccine if I had time in my busy schedule. (4)	○	○	○	○
I don't have enough information about the HPV vaccine to decide whether to get it. (5)	○	○	○	○
The HPV vaccine is so new that I want to wait a while before deciding if I should get it. (6)	○	○	○	○
Because I'm not sexually active	○	○	○	○

right now, I don't need the HPV vaccine. (7)				

GetVacTim1 Are you seriously thinking of getting the HPV vaccine?

❍ Yes, I would probably get the HPV vaccine today. (4)
❍ Yes, I would probably get the HPV vaccine within the next 30 days. (1)
❍ Yes, I would probably get the HPV vaccine within the next 6 months. (2)
❍ No, I am not thinking of getting the HPV vaccine in the future. (3)

STIMULUS

Now, we want you to read a story about a young women who is deciding whether to get the HPV vaccine. She hears information about the vaccine from a couple of different sources, which may influence her decision. Please read Sarah's story and respond to the questions.

Sarah is a 20 year old sophomore at the University of Kentucky. She has had sex a couple of times while in college, although she has not told her mother or doctor that she is sexually active.

She is trying to decide whether she should get the HPV vaccine. She knows that HPV is a common sexually transmitted disease among college-aged women. She also knows that a vaccine is available to protect against the types of HPV known to cause cervical cancer.

Sarah hears messages about the HPV vaccine from both her doctor and her mother.

At this point, participants are randomly assigned to message condition. Within each message condition, participants are randomly assigned to read the mother or doctor message first.

Argument Strength Indicate how much you agree or disagree with the following statements.

	Strongly Disagree (1)	Somewhat Disagree (2)	Somewhat Agree (3)	Strongly Agree (4)
The mother's/doctor's statement is a reason for not getting the HPV vaccine/for getting the HPV vaccine that is believable. (1)	❍	❍	❍	❍

The mother's/doctor's statement is a reason for not getting the HPV vaccine/for getting the HPV vaccine that is convincing. (2)	○	○	○	○
The mother's/doctor's statement gives a reason for not getting the HPV vaccine/for getting the HPV vaccine that is important to me. (3)	○	○	○	○
The mother's/doctor's statement put thoughts in my mind for not wanting to get the HPV vaccine/for wanting to get the HPV vaccine. (4)	○	○	○	○
Overall, how much do you agree or disagree with what Sarah's mother/Sarah's doctor had to say about the HPV vaccine? (5)	○	○	○	○

Argument Strength_Reason

	Very Weak (1)	Somewhat Weak (2)	Somewhat Strong (3)	Very Strong (4)
Is the reason Sarah's mother/Sarah's doctor gave for	○	○	○	○

not getting the HPV vaccine/for getting the HPV vaccine a strong or weak reason? (1)				

Credibility On the scales below, indicate your feelings about Sarah's mother/Sarah's doctor in this story.

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
Intelligent: Unintelligent (1)	❍	❍	❍	❍	❍	❍	❍
Untrained: Trained (2)	❍	❍	❍	❍	❍	❍	❍
Cares about Sarah: Doesn't care about Sarah (3)	❍	❍	❍	❍	❍	❍	❍
Honest: Dishonest (4)	❍	❍	❍	❍	❍	❍	❍
Has Sarah's interests at heart: Doesn't have Sarah's interests at heart (5)	❍	❍	❍	❍	❍	❍	❍
Untrustworthy: Trustworthy (6)	❍	❍	❍	❍	❍	❍	❍
Inexpert: Expert (7)	❍	❍	❍	❍	❍	❍	❍
Self-centered: Not self-centered (8)	❍	❍	❍	❍	❍	❍	❍
Concerned about Sarah: Not concerned about Sarah (9)	❍	❍	❍	❍	❍	❍	❍
Honorable: Dishonorable (10)	❍	❍	❍	❍	❍	❍	❍
Informed: Uninformed	❍	❍	❍	❍	❍	❍	❍

(11)							
Moral: Immoral (12)	◯	◯	◯	◯	◯	◯	◯
Incompetent: Competent (13)	◯	◯	◯	◯	◯	◯	◯
Unethical: Ethical (14)	◯	◯	◯	◯	◯	◯	◯
Insensitive: Sensitive (15)	◯	◯	◯	◯	◯	◯	◯
Bright: Stupid (16)	◯	◯	◯	◯	◯	◯	◯
Phony: Genuine (17)	◯	◯	◯	◯	◯	◯	◯
Not understanding: Understanding (18)	◯	◯	◯	◯	◯	◯	◯

SarahGetVc

	Very Unlikely (1)	Somewhat Unlikely (2)	Somewhat Likely (3)	Very Likely (4)
How likely do you think Sarah would be to get the vaccine? (1)	◯	◯	◯	◯

YouGetVc

	Very Unlikely (1)	Somewhat Unlikely (2)	Somewhat Likely (3)	Very Likely (4)
In thinking about what you read today (i.e., the messages from Sarah's mother and doctor), how likely are you to get the vaccine? (1)	◯	◯	◯	◯

BlfsGetVc2 Please indicate how much you agree or disagree with the following statements about getting the HPV vaccine.

	Strongly Disagree (1)	Somewhat Disagree (2)	Somewhat Agree (3)	Strongly Agree (4)
I absolutely will not get the HPV vaccine. (1)	○	○	○	○
I would consider getting the HPV vaccine if I had more information about it. (2)	○	○	○	○
I would get the HPV vaccine if it wasn't so expensive. (3)	○	○	○	○
I would get the HPV vaccine if I had time in my busy schedule. (4)	○	○	○	○
I don't have enough information about the HPV vaccine to decide whether to get it. (5)	○	○	○	○
The HPV vaccine is so new that I want to wait a while before deciding if I should get it. (6)	○	○	○	○
Because I'm not sexually active right now, I don't need the HPV vaccine. (7)	○	○	○	○

GetVacTim2 Are you seriously thinking of getting the HPV vaccine?
○ Yes, I would probably get the HPV vaccine today. (4)
○ Yes, I would probably get the HPV vaccine within the next 30 days. (1)

◌ Yes, I would probably get the HPV vaccine within the next 6 months. (2)
◌ No, I am not thinking of getting the HPV vaccine in the future. (3)

Thank you for completing this study! We really appreciate it! We would like to leave you with some information, in case you would like to learn more about the HPV vaccine and where in Lexington you can get it. The following information about the HPV vaccine is taken directly from the Centers for Disease Control and Prevention ("CDC") website.

Why is the HPV vaccine important? Genital HPV is a common virus that is passed from one person to another through direct skin-to-skin contact during sexual activity. Most sexually active people will get HPV at some time in their lives, though most will never even know it. HPV infection is most common in people in their late teens and early 20s. There are about 40 types of HPV that can infect the genital areas of men and women. Most HPV types cause no symptoms and go away on their own. But some types can cause cervical cancer in women and other less common cancers— like cancers of the anus, penis, vagina, and vulva and oropharynx (back of throat including base of tongue and tonsils). Other types of HPV can cause warts in the genital areas of men and women, called genital warts. Genital warts are not life-threatening. But they can cause emotional stress and their treatment can be very uncomfortable. Every year, about 12,000 women are diagnosed with cervical cancer and 4,000 women die from this disease in the U.S. About 1% of sexually active adults in the U.S. have visible genital warts at any point in time.

Which girls/women should receive HPV vaccination? HPV vaccination is recommended with either vaccine for 11 and 12 year-old girls. It is also recommended for girls and women age 13 through 26 years of age who have not yet been vaccinated or completed the vaccine series; HPV vaccine can also be given to girls beginning at age 9 years.

Will sexually active females benefit from the vaccine? Ideally females should get the vaccine before they become sexually active and exposed to HPV. Females who are sexually active may also benefit from vaccination, but they may get less benefit. This is because they may have already been exposed to one or more of the HPV types targeted by the vaccines. However, few sexually active young women are infected with all HPV types prevented by the vaccines, so most young women could still get protection by getting vaccinated.

How effective are the HPV vaccines? The vaccines target the HPV types that most commonly cause cervical cancer. One of the vaccines (Gardasil) also protects against the HPV types that cause most genital warts. Both vaccines are highly effective in preventing the targeted HPV types, as well as the most common health problems caused by them. The vaccines are less effective in preventing HPV-related disease in young women who have already been exposed to one or more HPV types. That is because the vaccines prevent HPV before a person is exposed to it. HPV vaccines do not treat existing HPV infections or HPV-associated diseases.

How safe are the HPV vaccines? Both vaccines have been licensed by the Food and Drug Administration (FDA). The CDC has approved these vaccines as safe and effective. Both vaccines were studied in thousands of people around the world, and these studies showed no serious safety concerns. Side effects reported in these studies were mild, including pain where the shot was given, fever, dizziness, and nausea. Vaccine safety continues to be monitored by CDC and the FDA. More than 46 million doses of HPV vaccine have been distributed in the United States as of June 2012. Fainting, which can occur after any medical procedure, has also been noted after HPV vaccination. Fainting after any vaccination is more common in adolescents. Because fainting can cause falls and injuries, adolescents and adults should be seated or lying down during HPV vaccination. Sitting or lying down for about 15 minutes after a vaccination can help prevent fainting and injuries.

The HPV vaccine is available at the University of Kentucky University Health Service (859-323-5823) and the Lexington-Fayette County Public Health Department ((859-252-2371).

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Professional Academic Experience

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Awards/Honors

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Texas A&M:

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Professional Publications

Cohen, E. L., & Head, K. J. (2013). Identifying knowledge-attitude-practice gaps to enhance HPV vaccine diffusion. Published online first in *Journal of Health Communication*. doi: 10.1080/10810730.2013.778357

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