THE INDIRECT EFFECTS OF EXEMPLIFICATION IN TWO-SIDED MESSAGES OF RISK

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

by

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August 2014

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Cornell University 2014

This dissertation examines the role of negative affect as a mediator of exemplification effects within the context of two-sided messages. To address this research, the dissertation integrates theories from information processing (e.g., affect primacy), information seeking (e.g., Risk Information Seeking and Processing model; RISP), and risk perception (e.g., affect heuristic) with the mass communication theory of exemplification. Focusing on the effects of information processing and risk perception, Chapter 3 reports on an experimental study that empirically tests the degree to which exemplars, by way of negative affect, influence readers' two-sided message recall and risk perception surrounding two controversial risk issues: vaccination and raw milk. Most important, the study bridges research on affect and risk perception with exemplification theory, while also providing practical guidelines for improved risk communication within the fields of public health and journalism. Chapter 4 documents a study that empirically tests the degree to which exemplars, by way of negative affect, influence readers' information seeking intentions and behavior, notably online comment reading. Most important, the study expands the RISP model by (1) bridging risk information seeking with exemplification theory (2) situating RISP within a novel methodological setting (i.e., a randomized experiment), and (3)

measuring a specific information seeking behavior not yet studied in RISP (i.e., online comment reading).

Overall, findings from the dissertation can (1) help expand our understanding of exemplification theory as it relates to visual exemplars and balanced reporting; (2) more precisely identify sources of risk amplification, uneven recall, and risk information seeking; (3) provide policy tools for improved risk communication in the field of journalism and public health.

BIOGRAPHICAL SKETCH

Graham Dixon was born in Lubbock, Texas. He completed an undergraduate degree in anthropology (2008) at the University of Texas at Austin. Following his undergraduate studies, he taught English in Higashine, Japan for the Japan Exchange and Teaching Programme (JET). While in Japan, he became interested in the role of news media in the communication of complex risk issues. This interest led him to Cornell University, where he studied risk communication under the guidance and mentorship of Professor Katherine McComas.

ACKNOWLEDGEMENTS

When I first arrived in Ithaca in August of 2009, I did not know a single person, nor did I have a clear research plan. Over the past five years, I have formed friendships that will last a lifetime, forged collaborative relationships with fellow graduate students and professors, and developed the foundation of what will be a fulfilling research program.

First, I am grateful to my dissertation committee for their mentorship and invaluable feedback. I am thankful to Sahara Byrne for always believing in my research abilities, but never hesitating to give me the critical feedback needed to make my work better. I am also grateful to have Jeff Niederdeppe on my committee. A tour de force in both the field of communication and softball (he was our best player on our softball intramural team), professor Niederdeppe provided much needed advice and guidance that improved my dissertation. As the external member, Rosemary Avery brought important perspectives that helped connect my dissertation findings to broader issues involving public policy. Lastly, it was a true honor and privilege to have Katherine McComas serve as my dissertation chair. She has been instrumental in my growth as a scholar, from including me on research projects, inviting me to mentor undergraduates, to introducing me to senior risk communication scholars, and allowing me to co-author peer-reviewed papers. She is a role model, advisor, and, most important, a friend.

I am also grateful to my good friends who were always there for me when I needed them. My friend Chris Clarke became an important mentor to me while he was finishing his Ph.D. program. Our collaboration on the autism-vaccine project laid the foundation for a research program that has resulted in three peer-reviewed publications, six conference presentations (two of which received top paper awards), and connections with scholars in the

health, communication, and risk community. It is a true honor to work with such a talented and funny man. I also recognize my dear friends Nighthawk and Katherine Evensen for giving me support when the stress of graduate school became too much. I will always think about our camping trips, poker nights, and the 100km Trailwalker hike when I recall my time at Cornell. I also want to thank my colleagues from the risk lab – Gina, Joe, Mary Beth, Meghnaa, and Sungjong. You all are the most awesome colleagues and friends a person could have and I look forward to seeing all of you at future conferences.

Additionally, I want to recognize AEJMC's COMSHER division for awarding me the Lori Eason Prize. Lori Eason tragically died of cancer before completing her dissertation on environmental risk communication and since 2004, the COMSHER division has awarded the top graduate student paper $1000 in honor of Eason. It was a true honor to have received the Eason prize. I especially want to thank Professor Gene Burd from the University of Texas, the Lori Eason estate, and other donors to the prize. I would also like to thank the National Science Foundation as well as U.S. taxpayers for providing funding for this dissertation (NSF#1260872).

Finally, I would not be the person I am today without the unwavering support of my family. I am most fortunate to have been raised in a family that values education and who have always supported me in my graduate school endeavors. To Mom and Dad, thank you. And lastly, Cornell University helped introduce me to the love of my life, Sasha. I am the luckiest man in the world to be with you and cannot wait to start our new chapter together in Washington.

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CHAPTER 1

INTRODUCTION

As a force, thing, or circumstance posing a danger to people or to what they value (Stern & Fineberg, 1996), risk is often encountered and learned through news media (Freed et al., 2011; Vasterman et al., 2005). News media often connect people to a variety of risk topics, including but not limited to, emergent scientific studies on health risks (Jensen, 2008), reports on environmental risks and climate change (Boykoff & Boykoff, 2004), or stories on health and scientific controversies (Clarke, 2008; Dearing, 1995). Relying on news media as a source for learning about complex risk issues, however, raises a number of questions, including the ways in which messages are presented or framed by journalists; how consumers process and seek risk information; and how and to what extent risk-related news affect people's judgment and decision surrounding important risk issues.

Accurate risk communication is often elusive in news media. Journalists routinely leave out important risk information, such as statistics and figures (in the case of coverage of the Chernobyl accident) (Rowe et al., 2000), scientific limitations and caveats (Parascondola, 2000; Jensen, 2008), and provide inaccurate or incomplete information for health risks such as breast cancer (Marino & Gerlach, 1999). Major causes of death, such as tobacco use or heart disease, are often underrepresented, while deaths much less likely to occur, such as toxic agents or automobile crashes, are overrepresented (Frost et al., 1997). Content analytic studies have also observed that despite the presence of a scientific consensus and overwhelming amount of evidence, journalists routinely provide equal space to opposing views on climate change (Boykoff & Boykoff, 2004) and the controversy surrounding the discredited link between vaccination and autism (Clarke, 2008).

While journalists' lack of sufficient scientific knowledge on a scientific issue may contribute to these discrepancies, institutional and cultural factors also play a role. For instance, scholars have posited that journalists operate under a different culture than scientists and health experts where journalists view themselves as guardians of the democratic process whereas scientists view that they are doing the same for scientific discourse (Hinnant & Len-Rios, 2009; Nelkin, 1987; Reed, 2001; Salomone et al., 1990). Journalistic norms, the unwritten rules and standards that govern how individual journalists engage in their practice, also play an important role in how journalists report news (see Cialdini, Kallgren, & Reno, 1991; Clarke, 2008). These norms include *economic norms* that motivate journalists to report on issues that can harness higher readership, resulting in greater advertising revenue; *balancing norms* that implore journalists to cover all sides of a story in order to maintain impartiality, fairness, and objectivity (Clarke, 2008; Dearing, 1995); and *personification norms* that influence journalists to humanize news with emotional content, such as vivid images (Boykoff & Boykoff, 2007).

Adherence to journalistic norms not only influence inaccurate science, risk, and health reporting, but can complicate public understanding of science, health, and risk issues. Balancing a scientifically-supported view against a maverick view, for instance, can heighten people's uncertainty around scientific issues with considerable evidentiary support and promote the erroneous perception that experts are divided over a scientific issue when in fact they are not (Dixon and Clarke, 2013a). Additionally, the use of vivid and emotional images to humanize (and sell) news could amplify people's risk perception surrounding low risk issues, thus causing unnecessary public concern (Brosius & Bathelt, 1994; Gibson & Zillmann, 2000).

Connecting the balance and personification norms of journalism, this dissertation focuses on the impact of emotional images in balanced news articles of risk. Empirical studies on emotional images have observed that embedding a visual in a news article about risk, such as a photograph conveying a particular threat, can influence the degree to which people recall information and can amplify risk perception (Zillmann, Gibson, & Sargent, 1999). In particular, embedded visuals that exemplify threats to health and safety lead toward greater systematic processing in the form of more extensive and careful reading of the article (Knobloch, Hastall, Zillmann, & Callison, 2003; Zillmann et al., 1999; Zillmann, Knobloch, & Yu, 2001). Despite these documented effects, research explaining *why* such an effect occurs is lacking. Why, for instance, do visual exemplars depicting victimization positively influence recall and risk perception? Are the mechanisms due to the visual's affective nature? Or do cognitive components play a more prominent role? Furthermore, since much of the aforementioned research was conducted with one-sided articles of risk, can these effects occur within a balanced article that presents conflicting risk information?

To help answer these questions, this dissertation integrates psychological theories from information processing (e.g., affect primacy), information seeking (e.g., Risk Information Seeking and Processing model; RISP), and risk perception (e.g., affect heuristic) with the mass communication theory of exemplification. Furthermore, addressing these questions is important because they (1) can help expand our understanding of exemplification theory as it relates to visual exemplars and balanced reporting; (2) can more precisely identify sources of risk amplification, uneven recall, and risk information seeking; (3) provide policy tools for improved risk communication in the journalism and public health field.

Rationale for Dissertation

There are important theoretical and practical rationales for writing this dissertation. First, the psychological theories used in the dissertation highlight the role of affect in a variety of perceptual and behavioral effects. For instance, affect primacy theory suggests people's affective responses to stimuli occur prior to cognition and during information retrieval, a person's affective response is typically the first element to emerge (Zajonc, 1980). Under this theory, affect is an important mechanism for how stimuli influence people's information processing. In a similar way, the affect heuristic (Slovic et al., 2004) suggests that, in addition to cognitive appraisals of risk, affective reactions toward a risk event or message stimulus can influence a person's risk perception. Risk messages eliciting strong affective reactions could then influence risk perception such that greater emphasis is placed on affective rather than cognitive appraisal of risk in a person's risk-related judgment and decision-making. Finally, the RISP model situates affect as an antecedent of risk information seeking (Griffin et al., 1999; Yang & Kahlor, 2013). Negative affect positively associates with information seeking, whereas positive affect positively associates with information avoidance.

Together, the aforementioned affect theories can be helpful in explicating exemplification theory – a mass communication theory that posits that information in exemplar form, such as a visual, can influence information recall and risk perception. Several decades of research on exemplification has found consistent effects of exemplars, both in print and video format, on recall and risk perception (Knobloch et al., 2003; Zillmann et al., 1999; Zillmann et al., 2001). However, while scholars have identified several heuristics as mechanisms of exemplification effects (i.e., availability heuristic), little empirical study has

been performed to more precisely identify why exemplars influence audiences. For instance, what about exemplars leads to higher recall or amplified risk perception, and do exemplars eliciting negative affect influence risk information seeking behaviors? Therefore, this dissertation includes two studies that examine affect as mechanism of exemplification in the context of article recall, risk perception, and risk information seeking.

Secondly, the dissertation is situated within the context of two-sided risk (i.e., balanced) messages. Balance is a prominent journalistic norm and occurs often in news coverage of risk issues (Boykoff & Boykoff, 2004, Clarke, 2008), and journalists routinely embed episodic visuals to exemplify only one side of a balanced article. For instance, in news coverage of the autism-vaccine controversy – a widely discredited belief that vaccines cause autism – journalists routinely included pictures of alleged vaccine-injured children against the more emotionally neutral statistics produced by medical scientists and health officials (Offit & Coffin, 2003). Furthermore, exemplification studies have primarily focused on one-sided messaging and have not explored the cognitive versus affective elements of conflicting message processing. Could exemplifying only one side of a two-sided risk article lead people to selectively recall one side over another, as well as heighten risk perception of the side that is exemplified? By focusing on two-sided messages, the dissertation highlights the degree to which embedded visuals influence selective recall and risk perception of two sided risk information.

In addition, situating this study within the context of two-sided risk messages can show the degree to which people rely on affect versus cognition in making judgments of risk. When presented with an article containing two conflicting risk interpretations (i.e., risk of performing an action versus risk of not performing an action), people might rely more on

their affective reaction elicited by message content, such as the visual, than their recall of the conflicting risk arguments when making risk judgments. Affective reactions driven by the visual exemplar might then be a stronger influence on risk perception than weighing the conflicting risk arguments presented in the article. Therefore, this dissertation provides more depth to exemplification effects by situating exemplars within two-sided risk articles.

Lastly, the dissertation can open up discussion surrounding journalistic norms – namely balanced reporting and use of exemplars to highlight low-risk situations – and identify best practices for improved risk communication. Exemplifying low risk issues with affect-laden visuals could influence individuals to recall one side of a message more than another. This could be problematic if the exemplified side is not scientifically supported or depicting an extremely low risk situation. Exemplifying only one side of a two-sided risk article could also foster inaccurate perception of risk likelihood and severity by amplifying risk perception surrounding low risk issues. This could be problematic for health programs, such as vaccination, where severe side effects are extremely rare and often caused by other factors. For example, in a balanced report about the risks of vaccination, including a visual exemplifying that the vaccine is risky could heighten people's risk perception surrounding a low risk issue and one that is instrumental for maintaining public health. Given these concerns, the dissertation provides empirically-supported recommendations for journalists and health communication practitioners for improved risk communication.

Research Topics

The dissertation studies (e.g., Chapters 3 and 4) are situated within two controversial risk topics – vaccination and raw milk. Both of these topics represent controversial risk issues that involve two competing views, but with only one viewpoint that is supported by a

scientific consensus and evidence. The raw milk controversy in the United States is represented by conflicting interpretations about the risk of consuming raw milk. On the one hand, the Centers for Disease Control and Prevention (CDC), the U.S. Food and Drug Administration (FDA), and other international regulators strongly advise against consuming raw milk, arguing that pathogens that are otherwise killed during the pasteurization process can substantially increase the risk of contamination. Peer-reviewed research strongly supports this notion, finding that raw milk is 150 times more likely to cause food-borne illness outbreaks than pasteurized milk, and such outbreaks have a hospitalization rate 13 times higher than those involving pasteurized dairy products (Langer et al., 2012). On the other hand, some people and organizations believe that raw milk can be produced safely and provide beneficial health effects, such as cures for allergies, asthma, and even cancers (Weise, 2012). These health claims, however, are not supported by peer-reviewed research/evidence (see FDA, 2006). This controversy is used in the proposed study because it involves uneven evidentiary support between two risk interpretations and because it has recently been featured in national news outlets (see Weise, 2012).

Similarly, controversy surrounding vaccination often involves two competing risk interpretations where only one interpretation is supported by a scientific consensus and evidence. For instance, news media have often focused on claims that vaccines cause severe side effects, such as limb paralysis, developmental disorders (e.g., autism), and death (Offit & Coffin, 2003). These claims are often balanced against views of the scientific and medical community who argue vaccination is safe and effective, and that severe reactions are extremely rare and often caused by other factors (Clarke, 2008).

The dissertation uses these two risk topics for several reasons: (1) both topics have been prominently featured within news media, (2) news media often report on these controversies in a balanced manner, which is this type of messaging that the dissertation focuses on, (3) these topics have been addressed by health officials as important controversies where better communication is needed, and (4) observed message effects should occur for both topics, which can demonstrate greater generalizability.

Outline of Following Chapters

Chapter 2 provides a comprehensive review of the theories used in the dissertation. First, the chapter reviews research on science and health journalism, focusing on the sociological factors that shape reporting styles and the problems that can arise from the use of balance and visuals to communicate controversial science. Reviewing the sociological factors of journalism practice and the reporting styles present within science and health journalism can (1) help to explain why journalists use certain reporting styles and (2) provide evidence that exemplars and balanced reporting – two reporting styles featured in this dissertation – are common features within American elite press. Secondly, the effects of these reporting styles, particularly with the use of visual exemplars (i.e., exemplification theory), are also reviewed. In reviewing exemplification theory, this chapter highlights important findings as well as theoretical gaps this dissertation seeks to fill, particularly with mechanisms of exemplification effects. Affect – a positive or negative feeling state – is identified as a potential mechanism of exemplification effects and is therefore the primary focus of this dissertation. The focus on affect then leads to a review of affect-centered theories on information processing, risk perception, and risk information seeking, noting how integrating these theories with exemplification theory can help to explain the mechanisms of

exemplification, while also improving their own explanatory power by situating them within new contexts (i.e., affect heuristic within a mass media context; RISP model within an experimental context; affect primacy within a two-sided message context). Lastly, affect and emotion are examined with a critical eye, taking note of key debates (i.e., discrete emotion theory versus dimensional emotion theory), as well as new developments regarding the complex nature of affect and emotion in the field of psychology. Overall, this chapter sets up the research questions and hypotheses that form the two empirical studies reported in chapters 3 and 4.

Chapters 3 and 4 describe two experimental studies whose findings fill the theoretical gaps described in chapter 2. Though these chapters report on two distinct studies, with the former focusing on two-sided article recall and risk perception and the latter focusing on risk information seeking, both extend exemplification theory by highlighting affect as an important mediator. Furthermore, these two chapters are formatted as distinct papers complete with literature reviews, hypotheses and research questions, methods, results, discussion, and conclusions. Implications for future study and communication practice are also covered in these chapters.

Entitled "Affective arousal as a mechanism of exemplification effects: An experiment on two-sided message recall and risk perception," chapter 3 reports on an experimental study that empirically tests the degree to which exemplars, by way of negative affect, influence readers' two-sided message recall and risk perception surrounding two controversial risk issues: vaccination and raw milk. Most important, the study bridges research on affect primacy and risk perception with exemplification theory, while also providing practical

guidelines for improved risk communication within the fields of public health and journalism.

Chapter 4, entitled "Affective arousal as mechanism of exemplification effects of online information seeking," documents a study that empirically tests the degree to which exemplars, by way of negative affect, influence readers' information seeking intentions and behavior, notably online comment reading. Most important, the study expands the RISP model by (1) bridging risk information seeking with exemplification theory (2) situating RISP within a novel methodological setting (i.e., a randomized experiment), and (3) measuring a specific information seeking behavior not yet studied in RISP (i.e., online comment reading).

Lastly, Chapter 5 provides implications of the dissertation findings on journalism practice, health communication, and future communication research.

CHAPTER 2

THE INDIRECT EFFECTS OF EXEMPLIFICATION: AN INTEGRATION OF AFFECT-BASED THEORIES AND MODELS

The following chapter provides a comprehensive overview of the theories used and integrated in the dissertation studies presented in chapters 3 and 4. First, journalism norms – the standards and practices that govern how journalists report on issues – are reviewed to provide context for why news media report on risk in certain ways. In particular, norms related to two-sided reporting and the use of emotional visuals are highlighted. Following discussion on journalistic norms, a substantive review of audience-level effects is presented with focus centered on exemplification theory. Affect-based theories and models such as affect primacy, affect heuristic, and RISP are then discussed for their potential integration with exemplification theory. Overall, this chapter provides theoretical context for the empirical studies chapters that follow.

Journalism Norms: Balance and Personification

Scholars have proposed that journalistic norms – rules and expectations that guide journalistic practice – are influential in how a risk story is reported and can play a role in how audiences understand and perceive complex risk issues. Norms refer to the rules and expectations for behavior that guide individual action within groups, organizations, and institutions (Cialdini, Kallgren, & Reno, 1991). In a journalistic sense, norms are instrumental in shaping how issues are reported and reflect many of the journalistic codes of conduct implemented at the institutional level. Central to journalistic norms is *objectivity*, which draws from rational explanations, collections of fact, and impartial reporting of events (Ward, 2004). For some, objectivity involves removing personal bias from any reporting

(Figdor, 2010). Others suggest that objectivity also requires the journalist to present not only one side of a complex or politically charged issue but instead fairly highlight multiple sides, even those supported by a minority (Entman, 1989). More recently, Kovach and Rosenstiel (2001) argue that journalistic objectivity is not about purging personal biases from reporting but rather providing "a transparent approach to evidence – precisely so that personal and cultural biases would not undermine the accuracy of their work" (p. 72). In this respect, the *method* of reporting is objective, not necessarily the journalist (Friend & Singer, 2007).

As a method of reporting, objectivity can be achieved using balance, which "aims for neutrality [and] requires that reporters present the views of legitimate spokespersons of the conflicting sides in any significant dispute…with roughly equal attention" (Entman, 1989, p. 30). Clarke (2008) considered this approach an example of "balance as quality" where two of the most influential perspectives are presented in a point-counterpoint format. For example, in reporting risk-related news, journalists may present views of a "maverick" – a person whose views are at odds with an established authority – along with the views of the (scientific) establishment (Dearing, 1995). However, journalists may also embrace as "balance as quantity" approach by highlighting all viewpoints regardless of how well known they are to audiences (Griffin & Dunwoody, 1997).

For scientific and health-related controversies, where multiple and competing risk perspectives are presented, the news media often play an important role in not only reporting on the controversy but also shaping how people understand the science in question (Dunwoody, 1999). However, while science is arguably a process of deliberation and discussion, it is rare for two competing perspectives to be split equally in terms of evidence (Smith, 2005). Despite this, scholars have noted that journalists often balance maverick

spokespersons against those of the mainstream (Dearing, 1995; Dunwoody, 1999) in an effort to maintain journalistic objectivity (Myrick, 2002), accuracy and impartiality (Ryan, 2001), and to create compelling news that sells (Dunwoody, 1999).

In cases where journalists provide two competing interpretations of a controversial risk topic where only one interpretation/viewpoint is supported by scientific evidence, they may fail to place the competing perspectives in an appropriate context, such as including which risk interpretation is supported by a scientific consensus. Dixon and Clarke (2013a) noted that leaving out this key piece of information amounts to a "false balance," which presents two competing viewpoints of a scientific controversy without mention that scientific evidence and a consensus among scientists supports only one viewpoint. In this regard, Nelkin (1987) explained that the media simply emphasize the conflict between the competing perspectives and not their differences of opinion.

Content analytic studies have found support for a false balance in the reporting of controversial science by news media, as well as some of the effects of such reporting. For instance, Clarke (2008) found that despite a medical and scientific consensus rejecting a link between vaccines and autism, journalists in the US and UK prestige press balanced proponents of the link with those against it 58% of the time. In another study, Dixon & Clarke (2013a) found that false balance in the reporting of the autism-vaccine link potentially leads to greater audience uncertainty regarding a link; a perception that experts are divided over the evidence (when in fact they are not); and lowered intention to have children vaccinated (Dixon & Clarke, 2013b). In the case of news coverage of climate change science, Boykoff & Boykoff (2004) found that the majority (52.65%) of global warming coverage by US prestige newspapers gave roughly equal attention to human-induced warming – a view

backed by a scientific consensus – as well as the view that it was due exclusively to natural, non-human factors. The emphasis on both perspectives was speculated to have helped attenuate meaningful debate on and the implementation of policies for reducing global carbon dioxide emissions.

However, while balance involves presenting two competing viewpoints, there are also important nuances for how competing viewpoints are presented, and these nuances can be influenced by other normative practices. Personification, which refers to the journalistic tendency to personalize or humanize news stories with highly emotional content, is one of these norms that can intersect with the balance norm (Boykoff & Boykoff, 2007). In general, research suggests that journalists evaluate risk news differently from scientists and other experts. These differences likely derive from what Nelkin (1987) considered cultural contrasts existing between scientists and journalists. In her benchmark book, *Selling Science*, she explained that journalists view themselves as guardians of the democratic process, whereas scientists view that they are doing the same for scientific discourse. This contrast then influences journalists to oversimplify scientific findings for easier public consumption by framing science and risk issues in episodic and emotional ways and scientists to overemphasize technical information and the scientific process. Furthermore, studies have found that journalists place greater weight on emotional and alarming imagery when communicating about science and risk (Salomone et al., 1990), and that emotional content is often viewed as important for maintaining objectivity. For instance, Pantii (2010) found that television journalists rarely distinguished news with high emotional content from good quality news. According to his participants, journalism presents a window on the world, "and

that emotions are seen as essential to journalism simply because they are essential to people's everyday life" (p. 172).

One example of personification is the use of exemplars, illustrative representations of information that highlight a person or event used to represent a broader class of base-rate information (i.e., numerical representation of a particular issue or event) (Zillmann, 2002; Zillmann, 2006). By using exemplars, a journalist might present a false balance by exemplifying only one side of a balanced news article of controversial risk topic. Whereas the aforementioned operationalization of false balance involved the omission of information that would otherwise put two competing viewpoints in proper context (i.e., including which side is scientifically-supported), the uneven use of an exemplar to highlight one side of a balanced article on a science or health controversy can also be considered a false balance for its uneven presentation.

Could the uneven use of exemplars in a balanced article affect audience information processing and perceptions of the risks discussed in the article? This is an important question, as health officials have noted that in news coverage of the autism-vaccine controversy – a controversy centered on the widely discredited belief that vaccines cause autism – journalists routinely included pictures of alleged vaccine-injured children against the more emotionally neutral statistics produced by medical scientists and health officials (Offit & Coffin, 2003). A greater emotional emphasis on the unscientific view (i.e., vaccines cause autism) by use of exemplars has been questioned as a possible factor in declining public confidence surrounding vaccination. The dissertation focuses on this type of "false balance," in that two sides may be evenly presented but only one side is exemplified by an emotional image and identifying caption. However, little research has sought to experimentally test *how* the

inclusion of emotional exemplars influence the degree to which readers process conflicting risk information and subsequently perceive the risks being portrayed. Therefore, the following sections explore (1) exemplification theory and (2) the role of affective arousal as a potential mechanism of an exemplar's effect.

Exemplification Theory

Introduced by mass communication scholar Dolf Zillmann, exemplification theory "addresses the formation and modification of beliefs about phenomena and issues on the basis of samplings of experienced and directly or indirectly witnessed concrete, unitary occurrences that share focal characteristics" (Zillmann, 2006, p. S221). The act of exemplifying events or information often takes the form of a visual representation, and in news coverage, visuals are often used to exemplify base-rate information – that is, general information of an event population that is typically composed of numerical information, such a statistical frequencies (Zillmann & Broisus, 2000). More specifically, an exemplar represents itself as a case study among a group that shares a primary characteristic. Secondary characteristics vary and, as Zillmann (2006) writes, are subject to quantification. For instance, a news article on vaccine safety might include a picture of a vaccinated child as a case study of vaccinated children. The vaccinated child represents the primary characteristic which remains constant. A secondary characteristic might identify this child as either (1) been injured by the vaccine or (2) not been injured by the vaccine.

Secondary characteristics of an exemplar can then help to form people's beliefs regarding personal and impersonal risk assessment, as well as affect how they process and recall information (Zillmann & Brosius, 2000; Zillmann, 2006). For instance, Zillmann et al. (2001) found that highly emotional exemplars that depict victimization are associated with

higher acquisition of textual information. Specifically, participants read the text of articles accompanied by photographs depicting victimization for longer periods of time, which led to higher acquisition and recall of the information. A similar finding was reported by Gibson & Zillmann (2000) when participants were exposed to articles containing threatening images.

For studies on risk perception, television news stories on risk that included exemplification by highly emotional victims increased victimization risk perception and problem severity among audience members (Aust & Zillmann, 1996). Zillmann and Gans (1996) performed a similar experiment involving a manipulated health newscast about the risk of developing melanoma cancer. One condition contained footage of advanced stage melanoma images – images the authors described as shocking and explicit. The inclusion of these images, as visual exemplars of melanoma cancer, elevated assessments of risk to others and self when compared to those exposed to the control newcast without explicit and shocking images.

Why do these effects on recall and risk perception occur? Zillmann (2006) offers three heuristics or mental shortcuts requiring minimal cognitive investment that operate under exemplification theory. First, exemplification effects can draw on the representative heuristic, which refers to "the degree to which [an event] (i) is similar in essential characteristics to its parent population, and (ii) reflects the salient features of the process by which it is generated" (Kahneman & Tversky, 1972, p. 430). People often rely on representation as a way of estimating risk likelihood. However, representation of a certain sample might not reflect the actual frequency and prevalence of its occurrence. For instance, exemplifying an atypical or highly unlikely event via a visual could influence individuals to erroneously perceive its likelihood as greater than actual estimates. This might occur if a

news article, in reporting on a story about a measles outbreak, presents a picture of measles patients who are identified as African American. The representativeness heuristic would predict that people base their probability judgments on the representation of African Americans in the exemplar, and because the exemplar grossly over-represents the actual risk that African American's face in developing measles, using this heuristic can lead to inaccurate risk estimates. In fact, in a study testing the effect of exemplification and group-based risk assessment, Gibson and Zillmann (2000) reported that selective photographic exemplification of an ethnic group regarding a story on disease increased people's risk estimates for that group.

In conjunction with the representativeness heuristic, the quantitative heuristic suggests people evaluate, often subconsciously, the distribution and prevalence of secondary characteristics of exemplars in ordinal ways rather than using more elaborate quantitative precision. For instance, prevalence and magnitude of occurrences of exemplar characteristics are ascertained in ordinal terms (e.g., few, many, a lot) rather than exact statistics (i.e., exact number or percentage of a characteristic represented). This minimizes cognitive involvement for faster judgments of prevalence and distribution of secondary occurrences and can be subsequently used for judging the magnitude of risks that threaten oneself and others.

Finally, the exemplification effects often operate under the availability heuristic, which suggests people make judgments based on the ease with which information comes to mind (Tversky & Kahneman, 1973). As a subconscious behavior, people rely strongly on the first element that comes to mind when making judgments. Exemplification effects operate under the availability heuristic when exemplars are easily accessible and retrievable in memory for when people making judgments about event populations and personal and

impersonal risk assessments. Exemplar properties are instrumental in whether they are more accessible to people in making judgments. Zillmann (2006) suggests that exemplars that elicit affective reactions – a positive or negative feeling state – are more easily available to retrieve in memory and will often be the first element to emerge when a person makes a judgment about event properties, probabilities, and likelihoods. From an evolutionary perspective, people are motivated to retreat from danger, and affective reactions, as fast and instinctive feeling states, can help inform on threats, dangers, and risks that require immediate action. In this manner, affective reactions to potentially dangerous stimuli can help direct attention using minimal cognitive resources to threats that help guide action, ultimately helping one's survivability.

Exemplification research has also identified affective reactivity as a potential mechanism of the observed effects (see Zillmann, 2006), finding that threatening and highly emotional exemplar visuals influence message recall (Baumgartner & Wirth, 2012; Gibson & Zillmann, 2000; Zillmann, Knobloch, & Yu, 2001), risk perception (Gibson & Zillmann, 2000; Xie, Wang, Zhang, Li, & Yu, 2011), and problem severity (Aust & Zillmann, 1996). However, studies examining emotional exemplars have done so without statistically testing the mediating effect of affect on the exemplar and outcome effect. Additionally, the time in which an effect occurs might also depend on the ease at which an exemplar comes to a person's mind. For instance, in Zillmann and Gan's (1996) study, the effect of emotional exemplars did not occur immediately following exposure to the exemplar, but rather two weeks following stimulus exposure. Zillmann (2006) surmises that as time passes, emotional imagery dominates the mind, while text and other base-rate information loses its impact. Immediately following exposure, text may still be compelling to the reader, which neutralizes

the influence of the visual exemplar (Zillmann, 2006). However, testing the emotional reactivity of exemplars with statistical mediation could expand on this phenomenon and determine whether highly emotional exemplars that actually elicit affective reactions can overcome this temporal constraint. For instance, could exemplars that elicit strong affective reactions override textual base-rate information immediately following exposure? If so, to what extent does affective reactivity play a role?

To help address the aforementioned questions, the following section provides a review of affect-based theories and proposes their integration with exemplification theory. First, this section discusses the complexity of affect and emotions then provides a review of psychological theories on affect primacy, the affect heuristic, and the risk information seeking and processing model. Finally, these theories are integrated with exemplification theory as a means of explicating the affective processes of exemplification effects.

Affective Mechanisms Behind Exemplification Effects

Affect

Extensively researched in the field of psychology, affect has cultivated strong interest among communication researchers as a way to understand the mechanisms of message effects (see Kuhn & Schemer, In Press; Nabi, 2002, 2003; Kim & Cameron, 2011). Affect is described as a range of complex feeling states and should not be characterized within one particular definition. For example, affect has often been considered a subconscious and automatic feeling of goodness or badness elicited by external stimuli. Slovic et al. (2004), for instance, proposes people hold an "affect pool," which is made up of images of perceptual and symbolic representations of previously encountered stimuli that are tagged or marked by their affective qualities along a positive and negative dimension. The precognitive and

dimensional nature of affect described in Slovic et al. (2004) contrasts with other conceptual definitions. First, emotional experiences, while also described as feeling states similar to affect, can occur as extended affect – a long term and stable feeling about a particular issue or event – or momentary affect – a feeling state captured at a given point in time that ebbs and flows from moment to moment. Momentary affect, as defined by Russell and Carroll (2009), is conceptualized in a similar way as Slovic et al (2004) definition of affect – affect ebbs and flows moment to moment largely in response to the external stimuli one encounters in the world and can be a subconscious and automatic response. Extended affect, however, situates affect within a long-term trait paradigm, suggesting a feeling state can remain constant irrespective of environmental situations and is more likely a product of cognition. In this regard, extended affect is situated within the appraisal model of emotion (see Frijda, 2004), which suggests emotional responses are the product of cognitive appraisals and not necessarily automatic and subconscious reactions described by Slovic et al (2004). For instance, one can maintain a long-term and stable negative feeling about a particular issue, such as holding a general negative feeling toward climate change, but can experience a subconscious and automatic short-term negative or positive feeling state about the same issue when exposed to a stimulus within a message about climate change.

Secondly, affect within risk communication literature is often described in dimensional terms (i.e., positive or negative) and not through specific discrete emotions, such as anger, fear, or happiness. The debate around dimensional versus discrete emotion theory has been a prominent feature within psychological research. Though research has consistently reported that discrete emotions of the same valence, such as anger and fear, produce differing responses to risks (Kuhn & Schemer, In Press; Xie et al., 2009),

dimensionality of emotion can also be an appropriate conceptualization of affect. For instance, scales measuring multiple discrete emotions have observed that discrete emotions of the same valence occur at the same moment in time across diverse cultural samples (Scollon et al., 2005; Vansteelandt, Mechelen, & Nzlek, 2005). Although these discrete emotions occur at the same moment in time, evidence strongly supports the bipolarity of affect in that negative and positive affect do not co-occur at the same moment in time (see Diener, 1999; Russell & Carroll, 2009). Therefore, if one is experiencing a positive affective reaction, he or she is not experiencing a negative affective reaction at the same time, vice versa.

Furthermore, research on the dimensionality versus discrete emotion discussion suggests that dispositional and environmental factors can play a role in whether a person experiences primarily one discrete emotion or multiple discrete emotions of the same valence at a given time. Barrett (1998) observed that individuals can rely on either valence (positive versus negative emotional states) or arousal (bodily activation) for emotional states. Individuals with a strong predisposition toward high valence of their emotional states will be more likely to experience discrete emotions of the same valence at the same time, whereas high arousal individuals are more likely to experience a single discrete emotional state. Additionally, research suggests that either forms of emotional experience can occur depending upon how individuals react to a particular stimulus. For example, research on emotional framing by Nabi (2002, 2003) and others (Kuhn & Schemer, In Press; Kim & Cameron, 2011) involve using news articles that elicit primarily one specific discrete emotion, such as anger, depending on how that article is framed. However, other stimuli might instead elicit dimensional or valenced reactions such that different discrete emotions of

the same valence are experienced together. Therefore, research measuring the affective nature of stimuli should consider whether the stimuli are likely to elicit dimensional or discrete responses.

To that end, the studies used in this dissertation utilize message stimuli and exemplars designed to elicit dimensional affective reactions, not one single discrete emotion. The theories reviewed below situate affect as a dimensional feeling state and are therefore used in explicating exemplification theory effects.

Affect Primacy and Message Recall

Although exemplification literature has explored the role of affect in message recall, its integration with theories on affect can be further explored. One of these theories is affect primacy, which posits affect occurs as an automatic reaction that precedes cognition and can be used to help explain exemplification effects on message recall. Notably, psychological studies have found that affect occurs as a precognitive state that is formed without extensive perceptual and cognitive encoding (Ittelson, 1973; Zajonc, 1980; Zajonc, 1984). People, moreover, are more likely to pay attention to and process information related from stimuli that provoked an affective reaction (Ochsner, 2000). Once formed, affective reactions are unlikely to be readily revoked, and when recalling a particular event, these reactions are usually the first element to emerge. The robust impact of affective reactions to everyday events was noted by influential psychologist Robert Zajonc (1980) who stated, “when we try to recall, recognize, or retrieve an episode, a person, a piece of music, a story, a name, in fact, anything at all, the affective quality of the original input is the first element to emerge” (p.154).

Our ability to recall an event then depends greatly on our ability to experience its affective qualities. Marketing research has found broad support for this concept. Ambler and Burne (1999), for instance, found that a person's ability to recall advertising material effectively depends greatly on the level of affect they experienced from the advertisement. In their study, participants were given Beta blockers (Propranolol) designed to inhibit the experience of affect from the stimuli but not remove their ability to recognize it. Those who received the Beta blockers measured lower advertising recall than those in the control condition. Similar to Damasio's (2004) study on patients with damaged frontal lobes, who reported lower decision-making performance, these results demonstrate that disruptions in the area of the brain responsible for affective experiences, be it induced by medicine or by injury, not only influence decision making performance but also the ability to effectively recall information.

Since affective reactions are quickly processed (Loftus et al., 1987; Ohman, 1988), paid more attention to than neutral stimulus (Graber, 1990; Bradley et al., 1992; Lang et al., 1999), and often the first element to emerge when recalling a particularly event or message (Zajonc, 1980), people might be more likely to recall parts of an event or message that provoked an affective reaction than parts eliciting neutral affective reactions. Negative stimuli, moreover, lead to stronger effects than positive stimuli, as evidence suggests people give more attention to negative stimuli than positive stimuli (Ochsner, 2000; Yegiyan & Lang, 2010). There are three reasons for this: (1) attentional and perceptual biases are commonly found for negative (e.g., threat-related) stimuli, but not for positive stimuli (Christianson & Fallman, 1990; Pratto & John, 1991; Williams et al., 1996); (2) people may have a bias to more extensively process negative information (Skowronski & Carlston, 1989;

Thomas & Diener, 1990); and (3) in an evolutionary perspective, an organism's ability to quickly detect and comprehend negative information supports its survivability (Ohman, 1988; Slovic et al., 2004).

Despite robust evidence suggesting that affect is an important factor in message recall in advertising and PSAs, there has been limited investigation on affective reactivity of exemplars that apply the affect primacy theory of information processing. For one, studies that have examined the influence of emotional exemplars on recall have typically done so in the context of one-sided messages (see Brosius, 1993; Zillmann et al., 2001). However, exemplification research on two-sided message recall, while limited, has found that emotional exemplars influence risk perception but not the recall of the exemplar presence or the number of interviews in the article (see Zillmann et al., 1999). Measuring readers' recall of the content of the article, such as arguments and examples, not simply structural pieces, such as number of interviews or presence of photographs, can provide a clearer picture of how participants process the information in the articles. Moreover, Zillmann et al (1999) did not examine the role of emotional exemplars in controversial risk topics, nor on issues of health related risk. This is important, as journalists often report controversial risk in two-sided and uneven ways (Clarke, 2008; 2010; Dearing, 1995). News coverage of vaccine safety, for instance, is commonly reported by balancing emotionally charged images and narratives of alleged vaccine victims against the more affect neutral statistically-based arguments of medical and scientific experts (Offit & Coffin, 2003; Offit, 2008). Therefore, the uneven presentation of emotionally charged exemplars in controversial risk stories, especially those where the scientific evidence largely falls on only one side of the controversy, could have a profound impact on how audiences/readers perceive the message

as well as the risks themselves. Additionally, the aforementioned research in advertising, PSAs, and exemplification, while focusing on the role of emotional content and recall, do not measure the affective reactions of participants. Instead, in the case of exemplars, researchers (Zillmann et al., 1999; Zillmann et al., 2001) either coded their conditions as either emotional or non-emotional themselves or by using participants in pilot studies. As a result, no true measurement of participants' affective reactions were recorded and thus used in their analyses.

In an effort to push this research forward , this dissertation integrates affect primacy with exemplification to better understand how the presence of emotional exemplars influence two-sided message recall of controversial risk information. Affective reactions to the message content are measured to determine the degree to which affect mediates exemplification effects on two-sided message recall.

Affect Heuristic

Affect has also been featured within the risk perception field as a means of understanding how people make judgments and decisions about risk. According to prominent risk scholars, people evaluate risk through two distinct modes of thinking: analytic and experiential-based thinking (Epstein, 1994; Sloman, 1996; Slovic et al., 2004). Analytically, people employ logic, reason, and conscious appraisal of probabilistic estimates to make sense of the risks encountered in their everyday lives. Experientially, risk perception is formed by fast, instinctive, and intuitive reactions that are often subconscious and automatic.

As an automatic and often subconscious feeling state, affect is considered an important component of the experiential system. For example, Epstein (1994, p. 716) considered the experiential system to be "intimately associated with the experience of affect"

in which a response to an emotionally significant event triggers the experiential system to search the memory banks for related events, along with their emotional accompaniments. Similarly, Slovic et al (2007) proposed that a person's mind holds an "affect pool" made up of images of perceptual and symbolic representations of previously encountered stimuli that are tagged or marked by their affective qualities. The ability to access this affect pool quickly is important for efficient decision-making. For instance, Damasio (1994) found evidence that the ventromedial frontal lobe (VMFL) in the brain, the mechanism in the brain responsible for experiencing affect, is strongly associated with decision making performance. Patients with damaged frontal lobes were unable to experience affective reactions even though they maintained a high level of cognitive capacity. As a result, their decision performance measured less than those with normal functioning VMFLs, indicating that the ability to experience affect is critical to decision making (Damasio, 2004; Adolphs et al., 1994; Phelps & Anderson, 1997).

In terms of risk, a readily available affect pool can be easier and more efficient for complex decision making, especially when the required judgment is complex and mental resources are limited (Slovic et al., 2007). However, in neglecting deliberate and analytical processing of risk information and instead relying on a fast and efficient rule of thumb, affective reactions are no different from how imaginability, similarity, and memorability (i.e., the availability and representativeness heuristics) serve as cues in making probability judgments (Kahneman et al., 1982). Therefore, the use of affective reactions as a mental shortcut to guide complex risk-related judgment and decision making has led scholars to describe it as a heuristic (Finucane et al., 2000; Slovic et al., 2004; Slovic et al., 2007).

The “affect heuristic,” like other heuristics in cognitive psychology, can help people navigate a complex and uncertain world without using many mental resources. However, by relying on simple affective cues, the heuristic can sometimes result in cognitive biases or errors. In one striking example, Denes-Raj and Epstein (1994) demonstrated in an experiment that given a choice to win $1 by drawing a red jelly bean from a bowl, participants more often than not chose to draw from a bowl containing a greater absolute number, but a smaller proportion, of red jelly beans (e.g., 7 out of 100) than from bowl with fewer red beans but a better probability of winning (e.g., 1 out of 10). While the participants reported that they consciously *knew* the odds were against them, they *felt* they had a better chance in winning with more red beans present. In Loewenstein et al’s (2001) “Risk as Feelings” hypothesis, these “anticipatory emotions” (i.e., the immediate visceral reactions to an event or stimulus) not only inform on risk but can produce behavioral responses that depart from what individuals view as the best course of action. Fear, for instance, can immobilize us when we have the greatest need for strength, make us anxious prior to boarding a plane despite self-reassurances that airplane travel is much safer than the drive to the airport, and force us to slam on the car brakes when sliding on ice despite knowing that is not the right course of action to take.

Additionally, biases resulting from the affect heuristic might also explain why members of the lay public evaluate the severity of various risks (e.g., nuclear energy, GMO foods) very differently from risk managers, scientists, and other experts. For instance, strong affective reactions, such as dread, have been described in early risk perception research as a major determinant for how the public perceives and accepts a wide range of risks (Fischoff et al., 1978; Slovic, 1987). Sandman (1989) later incorporated dread along with other factors,

including voluntariness, controllability, lethality, and fairness in his "outrage model," which he argued accounts for why public evaluations of risk differ from those of experts. However, expanding the investigative scope of affect's influence on public risk perception beyond explicit feelings such as "dread" or "outrage" is needed, particularly for explaining why discrepancies between lay and expert evaluation of various risks exist.

In exemplification research, studies of one-sided messages have found that television news stories on risk that included exemplification by highly emotional victims increased victimization risk perception and problem severity among audience members (Aust & Zillmann, 1996). Non-emotional exemplars had a significantly lower effect than emotional exemplars, suggesting affect is a significant factor in the perceptual power of exemplars. These emotionally charged exemplars can then, if they present risk information that is atypical or inaccurate, lead to distortions in audiences' perception of risk and problem severity (Brosius & Bathelt, 1994; Gibson & Zillmann, 2000).

Could a two-sided story on a controversial risk issue lead to the same distortions in risk perception when only one side of the story has an emotional exemplar? One of the few studies to look at this issue observed partial support for this notion, finding that news stories on rollercoasters presenting two risk interpretations – rollercoasters are safe/unsafe – significantly lowered safety perceptions when an exemplar of rollercoaster dangers (i.e., an image of a coaster accident victim) was present and no exemplar was used for the safe side (Zillmann et al., 1999). However, little is known to what extent emotional exemplars in two-sided messages lead to distortions in risk perception, especially when there is uneven placement of an exemplar representing a risk interpretation that is either atypical or not scientifically supported. Furthermore, the majority of the aforementioned studies (Brosius &

Bathelt, 1994; Zillmann et al., 1999; Gibson & Zillmann, 2000), while focusing on the effect of emotional exemplars and risk perception, do not measure participants' affective reactions; instead coding exemplars prior to the experiment or having participants measure their level of vividness. Therefore, it is not well known to what degree affective reactions toward exemplars influence risk perception, especially in the context of two-sided news articles covering controversial risk issues. Showcasing rollercoasters, while providing evidence that uneven placement of emotional exemplars influence risk judgments, does not address a topic where message effects could produce undesirable drops in healthy behaviors that could have a profound impact on public health (i.e., vaccine compliance). Therefore, this dissertation focuses on controversial risk topics that address significant public health related issues (i.e., vaccination and raw milk). Additionally, the sole two-sided study by Zillmann et al. (1999) used different images for the two risk interpretations; the image representing the unsafe perspective was emotionally negative whereas the image representing the safe perspective was an emotionally positive image (however, there was no manipulation check to ensure participants affective reactions toward the images aligned with the authors' coding). It is important to extend this research by keeping the emotional exemplars a consistent affective valence, which allows for a clearer comparison between uneven placement of affect-inducing exemplars in a two-sided risk message.

In extending the aforementioned research, this dissertation examines how the uneven placement of affect-laden stimuli – in this case, an exemplar made up of picture and identifying caption – in a two-sided risk message influences judgments of risk. In the case of two-sided risk messages, where one risk interpretation is supported by the full weight of scientific evidence and the other is not, placing a negative affective exemplar to the

unscientific interpretation (i.e., maverick side) and no exemplar to the scientific interpretations could influence not only recall but also people's judgments of risk to differ significantly from expert estimates.

Affect Drawn from the RISP Model

Affect is also prominently featured in the Risk Information Seeking and Processing (RISP) model as a means of explaining the variability in how people process, seeking, and avoid risk information (Griffin et al., 1999). Drawn from the heuristic-systematic model (Chaiken, 1980), the theory of planned behavior (Azjen, 1991), and mass media theory, RISP proposes that individuals seek risk information when they hold high information insufficiency, which is the gap between one's current knowledge and the knowledge he/she believes is needed. When individuals perceive they hold low knowledge on a particular risk topic and perceive their need for knowledge is high, the RISP model predicts they will seek information about the risk.

Although information insufficiency is central to the RISP model, other factors play a role. Individual characteristics of a person, such as their demographic and social backgrounds, cognitive processing abilities, past risk information seeking experiences, etc., can act as distal predictors of risk information seeking (see figure 2.1). Together, these individual characteristic variables directly shape informational subjective norms, which refer to a person's perception of what others expect his/her knowledge should be regarding a risk topic. Informational subjective norms then predict information seeking directly or indirectly, via information insufficiency. In addition, individual characteristic variables also shape a person's perceived information-gathering capacity (i.e., self-efficacy to perform information seeking). Motivations to seek information are moderated by a person's efficacy to perform

the action. Similarly, a person's relevant channel belief or attitude toward seeking information (i.e., whether he/she believes performing the action is good or bad) moderates the relationship in a similar way such that high information insufficiency will predict information seeking behavior when relevant channel beliefs are favorable toward information seeking and one perceives they have the efficacy to seek information.

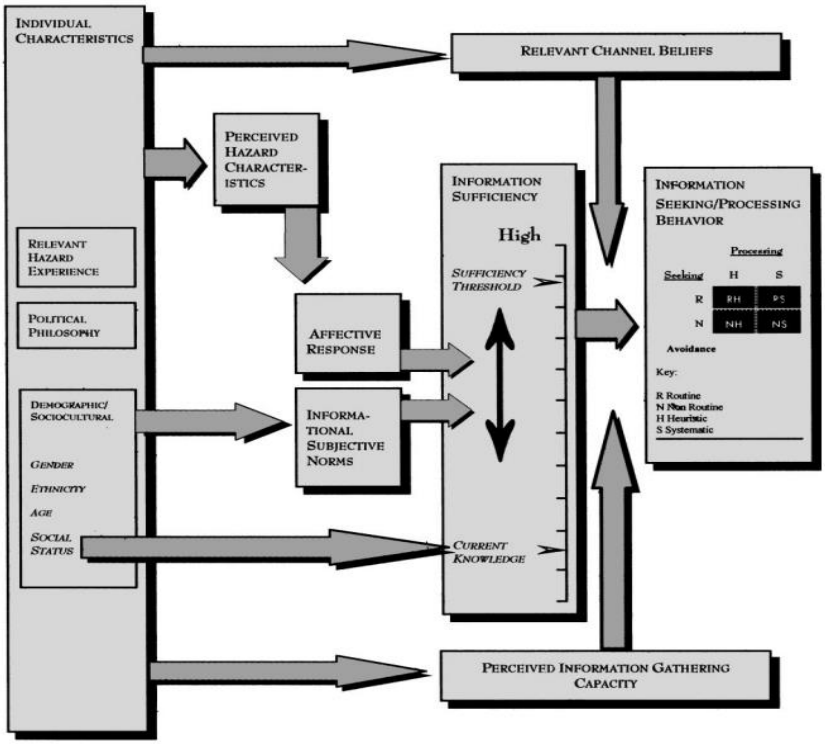

Figure 2.1. The RISP model. From Griffin et al (1999).

Affect also plays a prominent role in the RISP model. Positive and negative affect, for instance, are situated as predictors of risk information seeking avoidance and risk information seeking intention, respectively. Drawn from the appraisal theory of emotion (see Ellsworth & Scherer, 2003), the RISP model proposes that affective reactions are products of risk perception. In turn, affect can influence the degree to which one seeks information by the propensity at which it elicits a motivational reaction. Negative affect, due to its action tendency and action readiness, is likely to act as a motivational mechanism (Frijda, 2004).

For example, anger reactions influence people to seek control of the situation via information seeking (Griffin et al., 2008), whereas fear reactions influence information seeking as a means of danger control when people have efficacy to do so and their threat appraisal is high (Witte, 1994). Evolutionarily, negative affect motivates information seeking because an organism's ability to quickly detect and comprehend negative information supports its survivability (Ohman, 1988; Slovic et al., 2004). Positive affect, however, might reduce motivation to seek information when compared to negative affect because it suggests an environment without hazards and threats where attentional resources are needed for survival (Schwarz & Clore, 1983).

Recent research corroborates the opposing effects of positive and negative affect on risk information seeking. In a 2013 article in *Science Communication*, Yang & Kahlor observed that individuals' worry, concern and anxiety (and overall negative feelings) toward climate change positively associated with their intention to seek information about climate change. Excitement, hope, and happiness toward climate change (and overall positive feelings) positively associated with avoiding information about climate change. These affective reactions, moreover, were mediated by information insufficiency, such that negative affect increased information insufficiency, which in turn increased information seeking intentions. Positive affect, however, decreased information insufficiency, which in turn associated with reduced information seeking intentions.

Since affect is an important component of the RISP model, it is plausible that message features eliciting affective reactions will influence risk information seeking. However, the RISP model has not yet been applied to experimental studies measuring affect-inducing messages in general or with exemplars in particular. Additionally, survey research

has typically examined affect as an extended long-term feeling state about a particular issue, and not a reaction toward a message stimulus. Could messages that elicit negative affect influence risk information seeking intentions and actual behavior in a similar manner as documented by cross-sectional studies? Integrating exemplification theory with the RISP model could help address this question. Zillmann (2006) raised the point that information seeking in the digital age could be influenced by the embedded exemplars in news media. Online news about risks issues, for instance, might indirectly influence information seeking when exemplars that elicit a strong affective reaction are embedded in news articles. For instance, embedded visual exemplars that elicit negative affect might spur readers to seek more information in the form of specific online features, such as user comments attached at the bottom of news articles. Recent research has explored the effects of user comments on risk perception and health attitudes (see Anderson et al., 2013; Shi et al., 2013), finding that uncivil comments or comments that provide inaccurate health information can increased risk perception (toward nanotechnology) and foster negative attitudes toward important health behaviors (smoking cessation). However, little research has explored what factors influence online news consumers to read online comments and whether message features, such as those that elicit affective reactions, play a role. Could message features that elicit negative affective reactions, such as embedded visual exemplars, influence online comment reading? To explore this question, this dissertation bridges exemplification theory with RISP in an effort to understand the how affect-laden message features can prompt online risk information seeking behavior.

Dissertation Empirical Studies

Drawing on the theories described above, chapters 3 and 4 highlight two studies that integrate exemplification theory with affect primacy, the affect heuristic, and the RISP model. In particular, chapter 3 presents a study that empirically tests the degree to which affective reactions toward news articles of risk with embedded exemplars influence two-sided message recall and risk perception. Chapter 4 similarly tests the degree to which embedded exemplars within a risk story indirectly influence online risk information seeking behavior, via affective reactions. Together, these studies are situated within mass communication research and the message stimuli used, such as emotional exemplars and two-sided messaging, reflect the important journalistic norms that shape news reporting. Although the chapters are written as separate, stand-alone studies, both complement one another by empirically testing affective reactivity as a mechanism of exemplification effects and connecting their findings with established affect theories.

In all, the dissertation studies integrate affect theories with exemplification theory as means of better understanding the processes behind exemplification effects. By using experimental methods, the studies can shed new light on causality that cannot be adequately addressed using cross-sectional data (e.g., many RISP model studies). Lastly, because the studies involve controversial health risk issues, the results can help inform on methods to improve risk communication and journalism practice, such as identifying how exemplars can help or impede people's risk perception surrounding important public health issues.

CHAPTER 3

AFFECTIVE AROUSAL AS A MECHANISM OF EXEMPLIFICATION EFFECTS: AN EXPERIMENT ON TWO-SIDED MESSAGE RECALL AND RISK PERCEPTION

During the past twenty years of risk research, scientists have attributed affect – a rapid positive or negative feeling state measured by level of arousal – as an important factor in people's risk perception (see Greenberg et al., 2012). To date, psychological studies have examined the role of affect in people's judgment and decision-making of complex risk information, finding that affective reactions can inform on risk perception (Loewenstein, Weber, Hsee, & Welch, 2001), as well as significantly bias people's perception of risk to differ greatly from those of scientists and other experts (Fischoff, Slovic, Lichtenstein, Read, & Combs, 1978; Johnson & Tversky, 1983; Slovic, 1987). A second body of research, however, examines the presentation of risk messages by news media, looking not only at the type of risk information being presented, but also the norms that govern how journalists report on complex and controversial risk topics, such as providing balance to two competing risk interpretations (Clarke, 2008; Dearing, 1995; Dixon & Clarke, 2013). While these two literatures share attention to risk perception and media effects, little research has attempted their integration. To fill this gap, this paper expands on previous research on news coverage of risk by examining how affective reactions elicited by visual exemplars embedded in two-sided news articles influence risk related recall as well as perceptions of risk. Furthermore, this paper examines the degree to which people rely on affect versus cognition in making judgments of risk.

Literature Review

Defined as "things, forces, or circumstances that pose danger to people or to what they value" (Stern & Fineberg, 1996, p. 215), risk is often encountered and learned about through news media (Salomone, Greenberg, Sandman, & Sachsman, 1990; Vasterman, Yzermans, & Dirkzwager, 2005). However, content analytic studies have identified problems with risk reporting: news media often leave out important risk information, such as statistics and scientific limitations to studies (Jensen, 2008; Marino & Gerlach, 1999; Parascondola, 2000; Rowe, Frewer & Sjoberg, 2000) and under-represent major causes of death, such as tobacco use or heart disease, while over representing deaths much less likely to occur, including those due to toxic agents or automobile crashes (Frost, Frank, & Maibach, 1997). Studies have also observed that despite the presence of a scientific consensus and an overwhelming amount of evidence, journalists routinely provide equal space to opposing views on climate change (Boykoff & Boykoff, 2004) and the controversy surrounding the discredited link between vaccination and autism (Clarke, 2008). Because it elicits an erroneous perception that scientists are divided on an issue when that is not the case, "false balance" can heighten readers' uncertainty around certain science and lead to undesirable behavioral intentions around important public health issues (Dixon & Clarke, 2013).

However, people are not just influenced by the presence or absence of information within a news article but also affected by how a story is framed. As Nelson, Clawson, and Oxley (1997, p.568) explain, frames "shape individual understanding and opinion concerning an issue by stressing specific elements or features of the broader controversy, reducing a usually complex issue down to one or two central aspects." For instance, journalists often humanize news stories in an effort to draw readers into the story (Boykoff & Boykoff, 2007;

Gross, 2008). As an episodic frame, complex issues are simplified into one or two case studies that highlight individual rather than societal representations of a particular issue. The tendency to focus on individual rather than societal representations can affect audiences, from changing perceptions that individuals are responsible for their own problems (Iyengar, 1991) to influencing audience judgments on policy issues (Aaroe, 2011; Gross, 2008). Emotional arousal also appears to be a key mediator in episodic framing effects, with recent work suggesting the persuasive strength of episodic frames depends on their ability to elicit emotional reactions (Aaroe, 2011). In addition, researchers have observed discrete emotion frames, such as "sadness" and "anger" framed messages, to influence cognitive processing, policy preferences, and attitudes (Kuhn & Schemer, In Press; Nabi, 2002, 2003; Kim & Cameron, 2011).

Despite these findings, there remains much to be studied regarding the effects of emotional news messages. For example, scholars have observed emotional arousal to be a mechanism of episodic framing effects, but they have examined textual messages, not the presence of visuals which often accompany news stories. Additionally, emotional framing research typically involves framing messages designed to elicit discrete emotions (e.g., sadness frame vs. anger frame), and it is often situated within the paradigm that emotional arousal is the product of cognitive appraisals and not an automatic reaction to a stimulus, such as a visual (see Kuhn & Schemer, In Press; Nabi, 2002, 2003; Kim & Cameron, 2011).

The present study expands the aforementioned research in several ways. First, this study examines episodic visuals embedded within two-sided news articles to see whether affective arousal elicited by the visuals influences selective recall (i.e., recalling one side of the article more than the other) and amplifies risk perception. Unlike emotional framing

studies, which frame text in an emotional way, the present study examines affective arousal as a valenced (positive or negative) response to visual stimuli embedded within a news article.

Secondly, the study is situated within the context of two-sided risk (i.e., balanced) messages. Balance is a prominent journalistic norm and occurs often in news coverage of risk issues (Boykoff & Boykoff, 2004, Clarke, 2008), and journalists routinely embed episodic visuals to exemplify only one side of a balanced article. For instance, in news coverage of the autism-vaccine controversy – a widely discredited belief that vaccines cause autism – journalists routinely included pictures of alleged vaccine-injured children against the more emotionally neutral statistics produced by medical scientists and health officials (Offit & Coffin, 2003). Could exemplifying only one side of a two-sided risk article lead people to selectively recall one side over another, as well as heighten risk perception of the side that is exemplified? By focusing on two-sided messages, this study can then highlight the degree to which embedded visuals influence selective recall and risk perception of two sided risk information. Lastly, situating this study within the context of two-sided risk messages can show the degree to which people rely on affect versus cognition in making judgments of risk. When presented with an article containing two conflicting risk interpretations (i.e., risk of performing an action versus risk of not performing an action), people might rely more on their affective reaction elicited by message content, such as the visual, than their recall of the conflicting risk arguments when making risk judgments. Affective reactions driven by the visual exemplar might then be a stronger influence on risk perception than weighing the conflicting risk arguments presented in the article.

To that end, this study tests how the inclusion of emotional exemplars, as visual episodic elements within a risk article, influence how readers recall conflicting risk information and judge the likelihood and severity of the risks being discussed. The following section explores the role of affective arousal in information processing and risk perception and discusses research gaps this study fills.

Affect, Exemplification, and Information Processing

As a rapid positive or negative feeling state measured by level of arousal, affect has been examined as an influential factor in information processing and risk perception. Notably, some studies have found that affect occurs as a precognitive state that is formed without extensive perceptual and cognitive encoding (Zajonc, 1980). Once formed, affective reactions are unlikely to be readily revoked, and when recalling a particular event, these reactions are usually the first element to emerge. People, moreover, are more likely to pay attention to and systematically process central details from a stimulus that provoked a *negative* affective reaction, whereas positive affective reactions are more associated with heuristic processing and greater recall of peripheral information (i.e., parts of a message or event which has not elicited affect) (Bless et al., 1996; Bodenhausen, Sheppard, & Kramer., 1994). One reason for why this occurs is that, from an evolutionary perspective, an organism's ability to quickly detect and comprehend negative information supports its survivability (Ohman, 1988; Slovic, Finucane, Peters, & MacGregor, 2004). Similarly, the limited capacity model of motivated mediated message processing (LC4MP; Lang, 2006) suggests negatively arousing messages are sources of aversive activation that increase motivation for encoding central elements related to the source of the arousal, but leave fewer cognitive resources to process peripheral information. Studies measuring the LC4MP find

broad support for this prediction with negative arousal resulting in perceptual incongruencies in central versus peripheral details of pictures (Yegiyan & Lang, 2010) and eye witness to violent crimes (Loftus, E.F, Loftus, G.R, &; Maass & Kohnken, 1989). Specifically, people encode central details of a picture when it arouses negative affect but less of the peripheral details; eye witnesses to violent crime describe the weapon used in great detail (i.e., the source of the negative affective arousal), but provide inaccurate descriptions of the perpetrator or other peripheral details of the event.

In the context of mass communication, exemplification theory, which posits audiences recall certain features of news articles better when they are presented in the form of exemplars, such as visuals, rather than base-rates (i.e., statistical evidence) (Zillmann, 2002), could have strong affective underpinnings. For instance, Zillmann, Knobloch, and Yu (2001) observed that highly emotional exemplars depicting victimization were associated with higher acquisition of textual information. Specifically, participants read the text of articles accompanied by photographs depicting victimization for longer periods of time, which lead to higher acquisition and recall of the information. Gibson & Zillmann (2000) reported a similar finding when participants were exposed to articles containing threatening images, and more recent research by Baumgartner and Wirth (2012) observed that reading a negative article resulted in participants recalling more negative information than positive information from subsequent news articles. Exemplification studies of risk, however, have produced inconsistent results, finding positive influences on risk perception but not the recall of the exemplar presence or the number of interviews in the article (Zillmann, Gibson, & Sargent, 1999), and such studies have primarily focused on one-sided messages (see Brosius, 1993; Zillmann et al., 2001). Additionally, many exemplification studies, while focused on

the role of emotional content, did not measure the affective reactions of participants, instead coding their message stimuli as either emotional or non-emotional or using pilot studies (Brosius & Bathelt, 1994; Gibson & Zillmann, 2000; Zillmann et al., 1999; Zillmann et al., 2001). Furthermore, Baumgartner and Wirth (2012), while measuring affective reactions toward news articles, did not specifically measure which aspect of the articles – the visuals or the text – elicited the affective reaction.

In an effort to push this research forward, measuring one's affective reaction toward a visual exemplar can help to explain why exemplars influence readers' message recall. Since affective reactions are quickly processed (Loftus et al., 1987; Ohman, 1988), paid more attention to than neutral stimulus (Bradley, Greenwald, Petry, & Lang, 1992; Graber, 1990; Lang, Bolls, Potter, & Kawahara, 1999), and often the first element to emerge when recalling an event or message (Zajonc, 1980), people might be more likely to recall parts of an event or message that provoked an affective reaction than parts eliciting neutral affective reactions. Negative stimuli, as previously discussed, might lead to stronger effects than positive stimuli, as evidence suggests people give more attention to negative stimuli than positive stimuli (Ochsner, 2000). Because the evidence suggests negative affect leads to greater attention and subsequent recall, this study focuses only on *negative* affective stimuli. Furthermore, this study situates exemplar effects within a novel context of two-sided message recall. Specifically, it explores whether exemplification effects occur within articles discussing conflicting information and whether exemplifying only one side with a visual exemplar leads to greater recall of that side. Guided by the aforementioned research, this study proposes the following hypotheses:

H1: In a two-sided risk message, where only one side has a negative affect-inducing exemplar, readers will recall more arguments from the side exemplified compared to the other conditions.

H2: Negative affect will mediate the relationship between exemplar exposure and recall.

Affect, Exemplification, and Risk Perception

In addition to recall, affective reactions could also have a profound influence on how an individual perceives a risk depicted in a news article. In experimental settings, scholars (Johnson & Tversky, 1983; Slovic et al., 2004) suggest that biases in probability and frequency judgments attributed to the availability heuristic – i.e., the ease with which examples come to mind to make judgments about the probability of events (Tversky & Kahneman, 1973) – might be due in part to affect. For instance, by relying on affective reactions in judgment and decision making, the "affect heuristic" can sometimes result in cognitive biases or errors (see Slovic et al., 2004), including inaccurate probability estimates (Denis-Raj & Epstein, 1994), unsafe behavioral responses (Loewenstein et al., 2001), and amplified perceived terrorism risk (Kahneman, 2011).

In the case of exemplification, studies of one-sided messages have found that television news stories on risk that included exemplification by highly emotional victims increased victimization risk perception and problem severity among audience members (Aust & Zillmann, 1996). These emotionally charged exemplars can then, if they present risk information that is atypical or inaccurate, distort audiences' perception of risk likelihood and severity (Brosius & Bathelt, 1994; Gibson & Zillmann, 2000). More recently, Xie, Wang, Zhang, Li, and Yu (2011) found negative affect to be a significant mediator between

exemplar exposure and heightened risk perception, but only within the context of a one-sided news article and without measures of article recall. Therefore it is not known to what extent affective reactions toward the message content influences risk perceptions when accounting for participants' recall of risk arguments within the article.

To extend the aforementioned research, this paper examines how the uneven placement of affect-laden stimuli – in this case, an exemplar made up of a picture and identifying caption – in a two-sided risk message influences judgments of risk. Negative affective reactions elicited by an exemplar might be a positive predictor of risk perceptions in part because: (1) greater attention is paid to a message stimulus that elicits negative affect (at the expense of peripheral details) and (2) affective reactions to a message stimulus are typically the first element to emerge when recalling a risk. Therefore, negative affect as a mechanism of the availability heuristic could be an influential factor in how readers make judgments of risk. Moreover, in the case of balanced risk messages where one risk interpretation is supported by the full weight of scientific evidence and the other is not, using a negative affective visual to exemplify an argument from the unscientific interpretation and no exemplar to the scientific interpretation could influence people's judgments of risk to differ significantly from expert estimates. In exploring these ideas, the following hypotheses investigate negative affect as a mechanism of the exemplar-risk perception effect:

H3a: In a two-sided article discussing the risk from receiving a vaccine/drinking raw milk (action risk) versus the risk of NOT receiving the vaccine/drinking raw milk (inaction risk), embedding a visual exemplifying an action risk argument will significantly heighten *action*-related risk perception relative to other conditions.

H3b: Negative affect will mediate the relationship.

H4a: In a two-sided article discussing the risk of performing an action (action risk) versus the risk of not performing an action (inaction risk), embedding a visual exemplifying an inaction risk argument will significantly heighten *inaction*-related risk perception relative to other conditions.

H4b: Negative affect will mediate the relationship.

Lastly, in the above hypotheses, negative affect could be a stronger predictor of risk perception than a reader's recall of specific risk arguments detailed in the body of the news article. This is important, as it suggests a person's affective reaction could be used as a heuristic and be a more influential factor in risk judgments relative to a person's cognitive retrieval of specific risk information, such as the conflicting statistical risk arguments in a news article. The following research question explores whether affective reactions will be a stronger predictor of risk perception than argument recall:

RQ1: To what extent do participants rely on their affective reactions toward the news article and their recall of the article's risk arguments in making judgments of risk?

Methods

This study involved an online experiment using a general population panel from Qualtrics® survey company (n=516; mean age = 48; 68% female). The sample size was chosen *a priori* in order to achieve a .9 power given a medium effect size using the desired statistical analyses. The experiment consisted of a 2 article (raw milk or vaccine) by 3 condition (inaction exemplar, action exemplar, no exemplar) factorial design. Participants were randomly assigned using a built-in algorithm in Qualtrics® to read a balanced news article about vaccination or raw milk that presented three arguments that it was risky to perform an action (i.e., drinking raw milk/receiving a vaccine) and three arguments that it

was risky to not perform an action (i.e., not drinking raw milk/not receiving vaccine). The conditions consisted of either: (1) including an emotional picture exemplifying an action-risk argument (i.e., risks related to receiving vaccine/drinking raw milk); (2) including an emotional picture exemplifying an inaction-risk argument (i.e., risks related to not receiving vaccine/drinking raw milk); (3) or no picture. Using two risk topics was done to demonstrate that exemplification effects occur irrespective of the topic (see Table 1).

Affect, recall, and risk perception were measured after participants finished reading their article (measures were done in this order to minimize question priming effects). The study received IRB approval, #1301003550 (see Appendix 1).

Independent Variable

Vaccine article

The vaccine article discussed risks associated with the vaccine for Diphtheria, Pertussis, and Tetanus (DTaP). Modeled from actual news articles on vaccine safety, the article involved two conflicting spokespersons who each presented three statistically-based arguments regarding vaccine risks – the vaccine safety spokesperson presented numerical information that not receiving the vaccine was risky; the anti-vaccine spokesperson presented numerical information that the vaccine was risky to receive. Their arguments all contained statistical information. The number of arguments from both spokespersons was equal in addition to the amount of text devoted to each spokesperson (see appendix 2 for articles).

The manipulated exemplar consisted of an image of a small child in a hospital bed being tended to by an adult female. One article identified the child in a short caption as having a severe case of pertussis due to not receiving the DTaP vaccine – an exemplar of the argument by the pro vaccine spokesperson that not getting the vaccine increases the risk of

pertussis. The other article used the same image of the child, but identified her in a caption as having a severe reaction (limb paralysis) to the DTaP vaccine – an exemplar of the argument made by the anti-vaccine spokesperson that getting the vaccine is risky (e.g., can result in severe side effects). The third article contained no image and caption. Aside from the manipulation, the articles were identical.

Raw milk article

The raw milk article was modeled in the same form as the DTaP article. The article involved two conflicting spokespersons who each presented three statistically-based arguments regarding raw milk risks – the raw milk supporter presented numerical information that not receiving raw milk was risky for asthmatic children. The argument that not drinking raw milk is risky is a common argument made by raw milk proponents who tout raw milk's ability to reduce the risk of asthma and behavioral problems in children (Masterjohn, 2012). The anti-raw milk spokesperson presented numerical information that raw milk is risky to consume. Their arguments all contained statistical information designed not to elicit negative emotional reactions stronger than the manipulated exemplar. The number of arguments from both spokespersons was equal in addition to the amount of text devoted to each spokesperson.

The exemplar consisted of an image of a small child hooked up to a ventilator. One article identified the child in a caption as having had a severe asthma attack whose mother believes raw milk could have helped cure her asthma – an exemplar of the argument made in the text that not consuming raw milk increases the risk of severe asthma attacks in children. The other article used the same image of the child, but identified her in a caption as having had *E Coli* poisoning due to consuming contaminated raw milk – an exemplar of the

argument made in the text that consuming raw milk increases risk of foodborne illness in children. The third article contained no image and caption. Aside from the manipulation, the articles were identical.

Mediator

After reading the article, participants clicked onto a new screen and were asked "how much of the emotions listed below did you feel from reading the news article?" Recall-based ratings of affect, such as the one used in the present study, have been demonstrated to be accurate indicators of momentary affective experiences (Barrett, 1997) (see appendix 3 for the surveys used in this study). Participants answered a 4-item negative affect scale developed by Scollon, Diener, Oishi, and Diener (2005), which measures negative affect using four discrete emotions – irritation, guilt, sadness, and worry – and level of arousal (0 = not at all to 5 = maximum intensity). The scale was selected because the negative discrete emotions represent the major forms of negative affect (Diener, Smith, & Fujita, 1995). Positive discrete emotions were not included in the survey because evidence strongly suggests that the more a person is experiencing negative affect, the less he or she is experiencing positive affect – that is, negative and positive affect does not occur at the same moment in time (Scollon et al., 2005). Furthermore, Scollon et al (2005) reported the four negative emotions tend to be experienced together at the momentary level. Scores for each discrete negative emotion were averaged for each participant. The scale achieved good reliability (M = 2.8, SD = 1.3, α = .81).

Dependent Variables

Argument recall

Using text boxes, each participant was asked to recall up to six risk arguments made by the spokespersons in the article. Because each text box represented one recalled argument (as indicated to participants in the survey instructions), the unit of analysis was the recalled argument contained in each text box. This recall measure is similar to the one used recently by Carpenter & Boster (2013). Each unit was coded as either an inaction risk argument (i.e., mentioning one of the three inaction risk arguments made by the pro-vaccine/pro-raw milk spokespersons), action risk argument (i.e., mentioning one of the three action risk arguments made by the anti-vaccine/anti raw milk spokesperson), or other (i.e., information that was either ambiguous or not in reference to the arguments made in the articles). Recalled units rated as "other" were removed from the analysis following coding, as the primary interest of this research concerns the recall of the action and inaction risk arguments.

To reflect whether participants recalled one side of arguments more than another, a variable was created by subtracting participants' inaction risk argument recall score from their action risk argument recall score. A positive score represents recalling more action risk arguments relative to inaction risk arguments. Inter-rater reliability was established using Cohen's Kappa by comparing the author's ratings with that of an independent rater. A random sample of twenty percent of the recall items were pulled from the dataset for inter-rater reliability checks. Overall, the author and independent rater achieved satisfactory agreement, Cohen's Kappa = .74 (Landis & Koch, 1977).

Risk perception

The survey included measures for both action risk perception and inaction risk perception regarding raw milk or vaccination. Action risk perception was measured using a 6 point Likert scale (1= strongly disagree; 6=strongly agree) with perceived risk severity and

likelihood of harm items adapted from Dahlstrom, Dudo, and Brossard (2012) and Betsch, C., Ulshofer, Renkewitz, and Betsch, T. (2011). These items included: (1) Severe DTaP vaccine side effects (outbreaks linked to raw milk) are a serious problem in the U.S, (2) DTaP vaccine side effects (illnesses caused by raw milk) are a serious threat to public health, (3) DTaP vaccine side effects (illnesses linked to raw milk) are a larger health risk than most people realize, (4) The likelihood of experiencing severe side effects following the DTaP vaccine (from consuming raw milk) is high, (5) the likelihood of acquiring unknown long-term side effects from the DTaP vaccine (from consuming raw milk) is low (reverse item), and (6) the likelihood that the DTaP vaccine (consuming raw milk) negatively affects a person's body is high. Inaction risk perception involved the same 6 item scale, but the items measured perception of the likelihood of harm from *not* receiving vaccination/drinking raw milk and the severity of harm resulting from inaction[1].

Lastly, using guidelines provided by Zhao et al. (2011), a product term that combined the three action risk severity items ($\alpha = .9$) with the three action risk likelihood items ($\alpha = .78$) was used to create the action risk perception variable. The same product term that combined the three inaction risk severity items ($\alpha = .85$) with the three inaction risk likelihood items ($\alpha = .86$) was used to create the inaction risk perception variable.

Manipulation check

At the end of the survey, participants were asked whether their news article contained a picture and what the picture depicted via a multiple choice question. This measure ensured

[1] An exploratory factor analysis based on principle axis extraction and direct oblimin rotation (KMO= .879, Bartlett's X^2=3523.68, p<.001) indicated that the 12 risk perception items loaded onto two factors with eigenvalues greater than 1 – the six action risk perception items loaded onto one factor and explained 43.4% of the variance (Cronbach's α=.9) and the six inaction risk perception items loaded onto one factor and explained 26.3% of the variance (Cronbach's α=.9).

that people exposed to a particular exemplar understood what it depicted and it also provided evidence of participants who were not paying close attention to the material and survey. A majority (80%) of participants answered this question correctly. Participants who incorrectly answered these items were removed from the study, reducing the sample size to $n = 409$[2].

Table 3.1.
Table of conditions following removal of participants who incorrectly answered manipulation check.

	Action risk exemplar	Inaction risk exemplar	No exemplar
DTaP Vaccine	*n*= 63	*n*= 52	*n*= 78
Raw Milk	*n*= 72	*n*= 63	*n*= 81

A factorial multivariate analysis of variance (MANOVA) was used with article type (vaccine or raw milk) and condition (inaction exemplar; action exemplar; no exemplar) as main effects and negative affect, argument recall, action risk perception, and inaction risk perception as dependent variables. A MANOVA was used due to expected moderate correlations between the dependent variables. Separate univariate factorial ANOVAs were also administered with each dependent variable. Furthermore, a non-significant interaction between condition and article type is desirable, as it would suggest that differences between conditions occur in the same way for raw milk and vaccination articles.

Mediation analyses were performed using PROCESS (Hayes, 2013), which provides a point estimate and bias corrected 95% confidence interval for the indirect effects via

[2] The results were the same for the sample that included participants who failed the manipulation check and the sample that excluded them. However, the effect sizes were smaller for the sample including those who failed the manipulation check.

bootstrapping. The point estimate confidence interval and bootstrapping procedure is advantageous in that the sampling distribution for the indirect effect is not assumed to be normally distributed (Preacher, Rucker, & Hayes, 2007). PROCESS also allows for a dichotomous independent variable. As a result, PROCESS provides a more robust mediation model than earlier methods.

Results

No differences in gender, age, and race were observed between conditions, suggesting evidence of successful randomization. Using Wilk's Λ, there was a significant main effect of article type (raw milk versus vaccine) on the dependent variables ($F(4, 400) = 27.03$, $p<.001$; Wilk's $\Lambda = .79$, $\eta_p^2 = .213$). A main effect of condition (inaction risk condition, action risk condition, and control) on the dependent variables was also significant ($F(8, 800) = 4.51$, $p<.001$; Wilk's $\Lambda = .92$, $\eta_p^2 = .043$). However, an interaction between article type and condition was not significant ($F(8, 800) = 1.28$, $p = .253$; Wilk's $\Lambda = .98$). With the MANOVA assumptions met, separate univariate factorial ANOVAs are used for each dependent variable below.

Negative Affect

Findings from a factorial ANOVA indicate a main effect of article type (vaccine versus raw milk) on negative affect. Specifically, the vaccine articles aroused stronger negative affective reactions than the raw milk articles ($F(1, 403) = 9.7$, $p<.01$, $\eta_p^2 = .02$). A main effect of condition on negative affect was also significant ($F(2, 403) = 12.1$, $p<.001$, $\eta_p^2 = .06$), with no interaction effects between condition and article type ($F(2, 403) = 1.14$, $p = .24$). A non-significant interaction is desirable because it indicates that the main effect of condition is the same for both raw milk and vaccine articles. Bonferonni post-hoc tests show

that participants exposed to the action risk exemplar article reported stronger negative affective reactions (*M* = 3.24, *SD* =1.3) than the control article (*M* = 2.61, *SD* = 1.3, *p*<.001) and the inaction risk exemplar article (*M* = 2.6, *SD* = 1.2, *p*<.001). Differences between the inaction risk exemplar and control were non-significant (*p* = .99), indicating that the action exemplar article was the only condition to elicit a strong negative affective reaction relative to other conditions (see Figure 3.1).

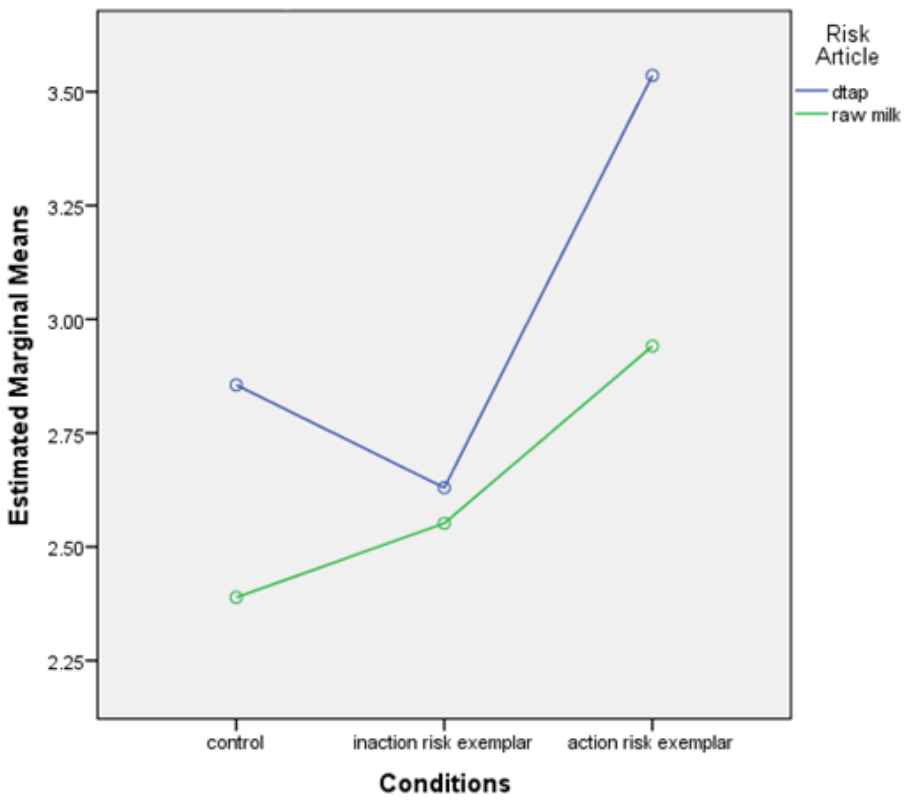

Figure 3.1.
Negative affect scores by condition and risk article type (n=409)

Hypothesis 1

Hypothesis 1 predicted that exposure to an article with an exemplar will increase the likelihood of recalling risk arguments from the side exemplified by the visual. The factorial

ANOVA reported a main effect of article type (vaccine versus raw milk) on article recall ($F(1, 403) = 15.1$, $p<.001$, $\eta_p^2 = .04$), and a main effect of condition on article recall ($F(2, 403) = 9.8$, $p<.05$, $\eta_p^2 = .02$), with a non-significant interaction between condition and article type ($F(2, 403) = .73$, $p = .48$). A Bonferroni post-hoc test revealed a significant difference in recall scores between the inaction exemplar condition ($M = -.6$, $SD = 1.6$) and action risk exemplar condition ($M = -.07$, $SD = 1.7$, $p<.01$). The control condition ($M = -.44$, $SD = .1.6$, $p = .15$) did not produce scores significantly different than the inaction exemplar condition ($p = .99$) or action exemplar condition ($p=.16$). However, a linear regression model found that being in the action risk exemplar condition was a stronger predictor of recalling more action risk arguments ($\beta = .102$, $p = .06$) than the inaction risk exemplar condition ($\beta = -.05$, $p = .38$) ($F(2,405)=3.47$, $p<.05$; $R^2 = .017$). Taking together the ANOVA and regression analyses, hypothesis 1 received partial support.

Hypothesis 2

With an observed main effect of condition on article recall and a marginally significant direct effect of action-risk exemplar condition on recall, the hypothesis 2 predicts negative affect as a mediator. Using PROCESS model 4, the independent variable consisted of being in the action risk exemplar condition (1 = yes; 0 = no) with the inaction risk dummy variable added as a covariate (see Hayes (2013) for guidelines on using 3 or more categorical independent variables in PROCESS). Overall, a full mediation model was observed (see Figure 1). Specifically, being exposed to the action risk exemplar articles significantly aroused negative affect (B = .61, $p<.001$), which in turn significantly increased the likelihood of recalling action risk arguments (B = .27, $p<.001$). Bootstrapped 95% confidence intervals did not include 0, indicating a statistically meaningful indirect effect (total indirect effect =

.17; 95% CI: .08, .32) (see Figure 3.2). An indirect effect was not detected for the inaction risk exemplar condition due to its non-significant effect on negative affect and recall. Therefore, hypothesis 2 received partial support.

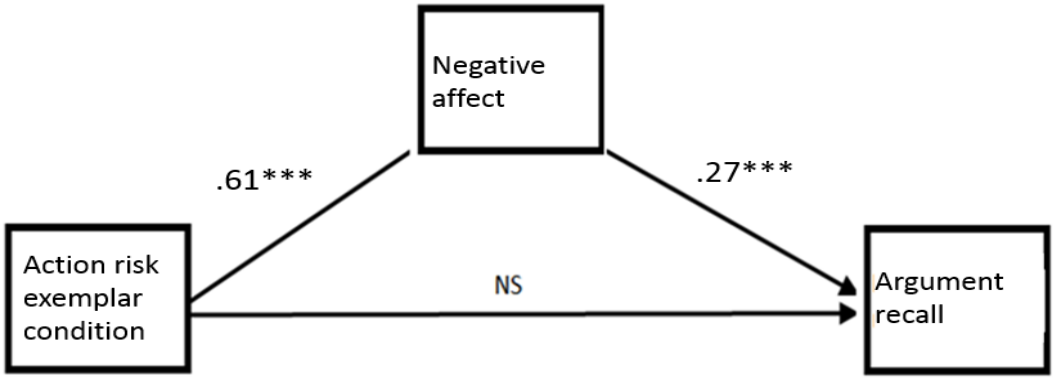

Figure 3.2.
Mediation model with action risk exemplar as the independent variable (controlling for inaction risk dummy), negative affect as mediator, and argument recall as the dependent variable.

Hypothesis 3a and 3b

Hypothesis 3a predicted that participants who read the action risk articles will report significantly higher action risk perception scores than participants in the inaction risk condition and control condition. Findings from the factorial ANOVA indicate a main effect of article type (vaccine versus raw milk) on action risk perception (see Figure 3.3). Specifically, participants reported higher action risk perception scores after reading the raw milk articles than the vaccine articles ($F(1, 403) = 9.6$, $p<.01$, $\eta_p^2 = .023$). A main effect of condition on action risk perception was also observed ($F(2, 403) = 8.9$, $p<.001$, $\eta_p^2 = .042$). Interaction effects between article type and condition were non-significant, suggesting differences between conditions were the same for the raw milk and vaccine articles (F(2,

403) = .056, p = .95).

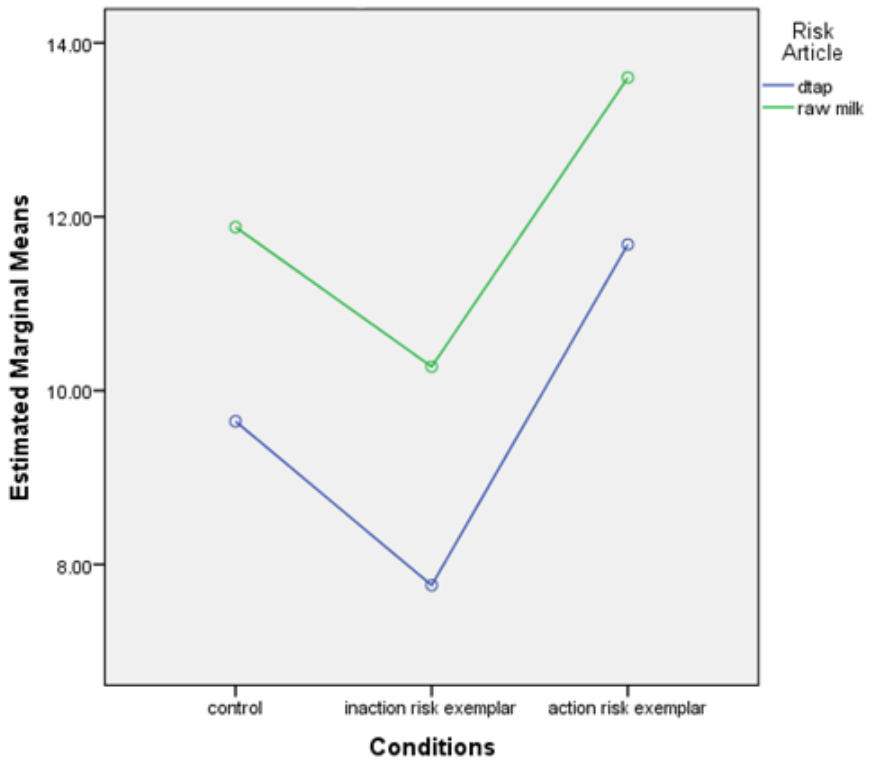

Figure 3.3.
Action risk perception scores by condition and article type (n=409).

Bonferroni post-hoc analyses reveal that participants in the action risk condition reported significantly higher action risk perception scores (M = 12.8, SD = 8.2) than those in the inaction risk condition (M = 9.1, SD = 5.9, p<.001) and control condition (M = 10.8, SD = 6.8, p<.05).

With an observed direct effect, hypothesis 3b proposed that negative affect acts as a mediator even when accounting for argument recall. Using PROCESS model 6, the independent variable consisted of being in the action risk condition (1 = yes; 0 = no) with inaction risk condition as a covariate, negative affect as mediator 1, argument recall as mediator 2, and action risk perception as the dependent variable. Specifically, the model examines whether reading an article with an action risk exemplar arouses negative affect,

leading to recalling more action risk arguments, which in turn heightens action risk perception. Using PROCESS model 6 not only provides statistical evidence of mediation but also demonstrates the extent to which participants use affect and argument recall in making their risk judgments.

A full mediation model was observed: when accounting for negative affect as a mediator, the direct effect became insignificant (see Figure 3.4). Specifically, being exposed to the action risk exemplar articles significantly aroused negative affect (B = .61, *p*<.001), which in turn positively influenced action risk perception (B = 2.1, *p*<.001).

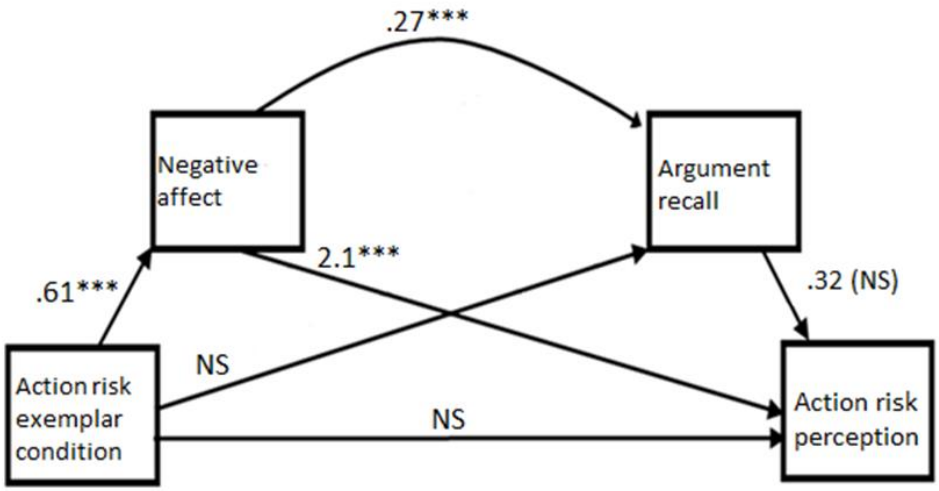

Figure 3.4.
Mediation model with action risk exemplar as the independent variable (controlling for inaction risk dummy), negative affect as mediator 1, and argument recall as mediator 2, and action risk perception as the dependent variable.

While negative affect increased the likelihood of recalling action risk arguments (B = .27, *p*<.001), recalling more action risk arguments did not significantly influence action risk perception (B =.32, *p* = .1). Bootstrapped 95% confidence intervals did not include 0,

indicating a statistically meaningful indirect effect (total indirect effect = 1.25; 1000 Bootstrapped 95% CI: 0.62, 2.14). Therefore, hypothesis 3b received full support.

Hypothesis 4a and 4b

Hypothesis 4a predicted that participants who read the inaction risk articles will report significantly higher inaction risk perception than the other conditions. Findings from the factorial ANOVA indicate a main effect of message (vaccine versus raw milk) on action risk perception (see Figure 3.5).

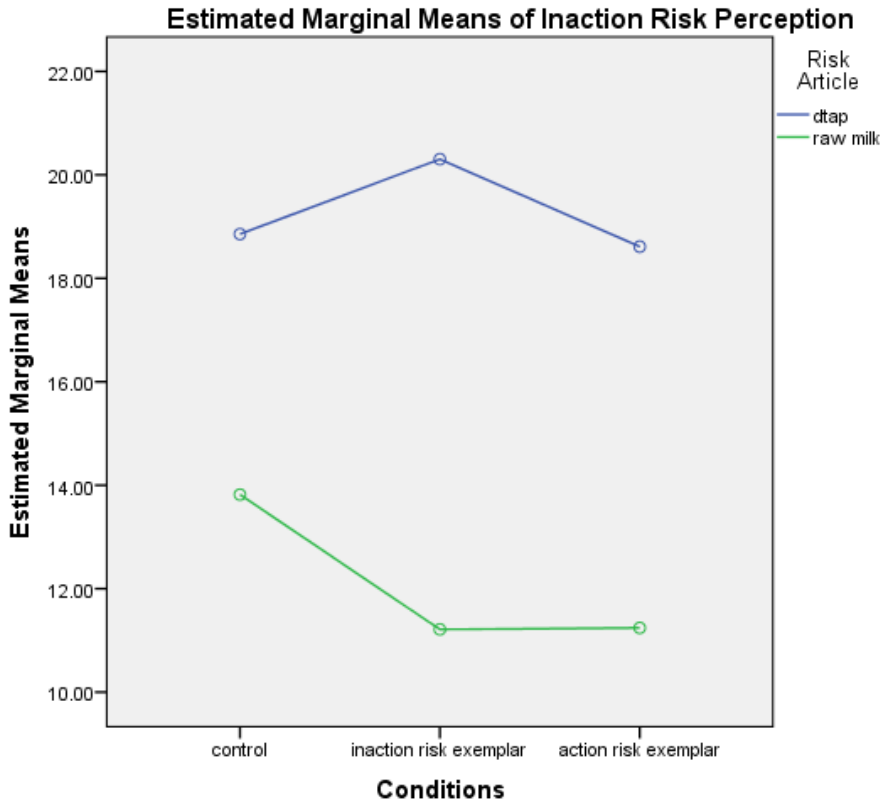

Figure 3.5.
Inaction risk perception scores by condition and article type (n=409).

Participants reading vaccine articles reported higher inaction risk perception than those who read the raw milk articles ($F(1, 403) = 81.4$, $p<.001$, $\eta_p^2 = .17$). However, no main effects for condition were observed ($F(2, 403) = 1.15$, $p= .32$); interactions between article type and

condition were also non-significant ($F(2, 403) = 2.24$, $p = .11$). Therefore hypothesis 4a is not supported.

A mediation model also did not find a significant indirect effect of being in the inaction risk condition and having a heightened inaction risk perception (B = -.02, 95% CI: -.05, .02). Negative affect, however, positively influence argument recall (B = .27, $p<.001$) and inaction risk perception (B = .93, $p<.01$). Consistent with hypothesis 3b, argument recall did not significantly influence inaction risk perception (B = .29, $p = .28$). Therefore, H4b was also not supported.

Discussion

The findings suggest exemplifying risk arguments with emotional visuals can have an effect on two-sided article recall and risk perception. In particular, participants who read a balanced risk article with a visual exemplifying only one side of the article – in this case, the action risk arguments – were more likely to recall action risk arguments and had stronger action risk perceptions than participants assigned to the other conditions. This effect occurred the same way irrespective of article type (raw milk or vaccines). Negative affect, moreover, mediated these effects, suggesting negative affect elicited by the action risk exemplar was the mechanism behind the observed effects. In fact, the null findings of the inaction risk conditions on recall and risk perception could be due to the inaction risk exemplar failing to elicit a negative affective reaction. Similar to its influence on action risk perception, negative affect positively influenced people's inaction risk perception. Given this finding, if an inaction risk exemplar can successfully elicit negative affect, then it is likely that the exemplar can indirectly influence inaction risk perception.

Most important, the findings provide evidence for why a particular exemplar can influence risk perceptions by highlighting the role of people's affective reactions to and recall of risk information. Participant's negative affect toward the article, driven by exposure to the action risk exemplar, had a stronger influence on risk perception than their recall of the article's risk arguments, illustrating that participant's relied more on their affective reactions to the news content in making judgments of risk than their recall of specific risk arguments in the article. This finding provides further empirical support that people evaluate risk through analytic (logical and conscious appraisals of risk information) and experiential-based routes (fast, instinctive, and emotional reactions) (Slovic et al., 2004), and that affect might play a larger role than cognitions in risk perception when emotional visuals are used.

Lastly, findings suggest negative affect elicited by an exemplar can heighten risk perception surrounding an issue that is low risk and instrumental for preventing infectious disease (i.e., vaccination). Exemplifying an unscientifically-supported interpretation of a risk issue can potentially misinform audiences on risk by amplifying it when risk research suggests it poses minimal harm and provides an important public benefit. On the other hand, exemplifying an action risk argument that is scientifically supported, in the case of raw milk, might accurately inform the public on the risks it poses. The use of exemplars in science and health communication can be helpful tools in risk communication when used appropriately.

To that end, results from this study can potentially open discussion on methods of improving science and health reporting. While the use of balanced reporting and emotional content is in many ways justified for ensuring objectivity and impartiality, journalists should consider the unintended consequences these reporting styles can have on readers' health behavior, scientific knowledge, and scientific trust. Scholars have pointed to several ways of

improving science and health news, such as including limitations and caveats of a scientific study being reported on (i.e., hedging; Jensen, 2008) and providing evidentiary context on a scientific controversy so that readers have information about the state of scientific evidence regarding two or more conflicting claims. Hedging has been found to increase trust towards scientists portrayed in a news article (Jensen, 2008), whereas including evidentiary context in a balanced article on the autism-vaccine controversy improved readers' certainty that vaccines are not linked to autism (Clarke, Dixon, Holton, & McKeever, In Press). Evidentiary context draws on two-sided messaging research by inserting a refutational message that makes the reader aware that while there are two sides to a certain controversy, only one is supported by evidence and a scientific consensus. While research is ongoing, meta-analytic studies on two-sided message persuasiveness suggest that using evidentiary context in a refutational manner can be viewed as more credible and persuasive than a one-sided message (O'Keefe, 1999). Most important, including refutational information would still allow journalists to include emotional exemplars highlighting atypical and/or unscientific risk arguments, while at the same time providing information that accurately conveys the state of scientific evidence surrounding a controversy. Therefore, future research should examine whether including refutational information, such as evidentiary context, attenuates the effect of an emotional exemplar in a news article.

Limitations

Due to the online nature of this study, discussion surrounding validity and reliability is warranted. Recent studies have observed no differences between lab and online responses for a variety of research topics, including message recall (Saunders, Bex, & Woods, 2013) and judgment and decision making (Berinksy et al., 2012; Paolacci, Chandler, & Ipeirotis,

2010). Another concern with online studies is the presence of habitual survey-takers and cross-communication between participants. Evidence suggests communication between participants is rare and participation interest is driven by payment; not the topic of the survey (Chandler, Mueller & Paolacci, In Press). Additionally, Berinsky et al (2012) found that the 88% of participants took two or fewer surveys in the last month on MTurk, a crowdsourcing site often used to obtain survey participants, and only 2.4% of responses registered with the same IP address, indicating habitual and multiple survey-taking is uncommon. Overall, evidence strongly supports online social science experiments as valid and reliable methods of data collection.

Selective attrition is also a concern when doing an online experiment. Horton, Rand, and Zeckhauser (2011) mention that if one treatment poses a greater burden on participants than another, online participants might feel it is easier to withdraw from participation than in a lab setting. The experimental conditions used in the present study are identical except the presence of an exemplar and type of message (raw milk versus vaccination), which is unlikely to cause an undue burden resulting in selective attrition. Furthermore, participant dropouts following treatment exposure were not significantly different between conditions. Secondly, the author recognizes the overrepresentation of female participants in the study. Despite overrepresentation of females, between-condition analyses observed statistical equivalence. Bivariate correlations also reveal non-significant relationships between gender and the dependent variables, suggesting gender is not linked with the variables of interest in the present study. Non-significant differences between conditions coupled with the lack of correlations in a high powered study suggest that overrepresentation of females does not threaten the study's validity.

Additionally, the failure of the inaction exemplar to elicit an affective reaction is interesting considering it consisted of the same visual as the action exemplar, but instead it depicted the risk associated with *not* getting vaccinated/drinking raw milk. Although scholarly efforts to address inaction risk communication, particularly with vaccination and climate change, have been ongoing (see Moser, 2010), future research should examine the asymmetry of affective reactions toward inaction and action risk exemplars and explore how inaction risk can be appropriately conveyed using visual stimuli. Individual difference variables not measured in the present study could play an important role in explaining *when* an inaction exemplar is likely to elicit an affective reaction. For instance, participants used in this study might have been more familiar with the inaction risk arguments, and this familiarity might have had a desensitization effect on their affective reaction. Desensitization occurs when people experience a diminished psychological or emotional responsiveness to a stimulus following repeated exposure to it (see Bartholow et al., 2006; Wolpe, 1982). In fact, research on the effects of media violence has demonstrated that repeated exposure to violent media can desensitize viewers to real effects of violence (Griffiths & Schukford, 1989; Smith & Donnerstein, 1998). Initial viewing of violent images produce emotional reactions such as fear and disgust (Cantor, 1998); however, repeat exposure attenuates its level of emotional arousal, leading to more aggressive behavior (Cline, Croft, & Courier, 1973; Linz, Donnerstein, & Adams, 1989). In a similar way, individuals who have been repeatedly exposed to risk messages by way of media or via interpersonal means, might experience attenuated emotional arousal from messages about these risks. Although not measured in this dissertation, future research could include measures of risk familiarity to determine whether

familiarity interacts with affective arousal toward risk messages in general, and visual risk exemplars specifically.

Another explanation for the asymmetry in affective reactions toward the action and inaction risk exemplars could be explained by participants' perception of attribution of responsibility. Attribution theory explains how individuals attribute the causes of and responsibilities for a particular event. Specifically, our observations can impact how we determine the causality of an event (Heider, 1958). In some cases, we view the causes of an event to be due to internal (dispositional) factors brought by the actions of an individual. In other cases, causes of an event might be due to external (situational) factors beyond the control of the individual. The type of causal attribution – internal or external – can also play a role in how people perceive risk. For instance, Stellstrom et al. (2000) measured mothers' causal attributions of hypothetical accidents involving children, finding a positive correlation between mothers' perceived risk of injury to the child and attributing causal responsibility to internal factors (i.e., the child) rather than external factors (i.e., environment or chance). Furthermore, other research suggests risks judged to be more controllable or voluntary tend to be less dreaded (Slovic, 1987), and more control an individual perceived s/he has over a risk, the less/he holds external conditions responsible for causing the risk (Rickard, 2014). Therefore, risks attributed from internal conditions are perceived as more controllable.

Drawing on the above research, inaction and action risk exemplars could be eliciting different risk perceptions due to differences in attribution of responsibility. For example, it could be that people perceive that one is less responsible for the risks associated with *not* getting vaccinated or not drinking raw milk, however severe, because they perceive external rather than internal factors are attributed to the risk. For example, risks associated with non-

vaccination, such as acquisition of a disease, can also be attributed to external factors independent of non-vaccination, such as a disease epidemic. People might then feel less responsible for the risks of vaccine/raw milk inaction given they perceive external factors can also cause the risk. On the other hand, people might perceive greater responsibility for the risks of vaccination or drinking raw milk because they perceive that the act of vaccination or raw milk consumption (internal attribution) is the sole cause of the purported risk. If they perceive internal factors as the primary cause of the risk (i.e., vaccination is directly the cause of the reported side effects), people might feel more responsible for risks that occur after choosing to vaccinate/consume raw milk. This finding could explain why the inaction exemplar failed to produce a significant effect on affect and risk perception, whereas the action risk exemplar did. Future research that measures participant's attribution of responsibility could determine whether attribution explains this asymmetry between exemplar types.

It is also important to note that the study measured negative affect as a scale of four negative emotions and not in terms of only one discrete emotion, such as anger or worry. Recent research suggests different negative discrete emotions, such as fear and anger, can produce differing responses to risks (Kuhn & Schemer, In Press; Xie et al., 2011). While acknowledging these findings, the present study measured affect as a dimensional feeling state based on four discrete negative emotions similar to how affect heuristic studies operationalize affect as a two dimensional (positive versus negative) and general feeling state (Slovic et al., 2004). This was done because different discrete emotions of the same valence can co-occur at the momentary level, indicating that irritation and sadness can be experienced at the same time (Scollon et al., 2005). Not only did the present study find the

scale to be highly reliable, Scollon et al (2005) found clear evidence that the four negative discrete emotions from their scale co-occurred at the momentary level with participants of different cultural backgrounds.

Furthermore, emotion research suggests new directions to the dimensionality versus discrete emotion debate. Evidence suggests that either forms of emotional experience can occur depending upon how individuals react to a particular stimulus (see Vansteelandt, Mechelen, & Nzlek, 2005). In some cases, messages might be framed to primarily elicit one discrete emotion, such as anger or fear, at the momentary level (see Kuhn & Schemer, In Press; Nabi, 2002, 2003; Kim & Cameron, 2011). Other stimuli might instead elicit dimensional or valenced reactions such that different discrete emotions of the same valence are experienced together. The present study used an affect scale developed and validated as a valence scale (see Scollon et al., 2005). The high reliability of the affect scale in the present study suggests the articles and their embedded exemplars elicited multiple discrete emotions at the same level of arousal. Therefore, the author believes a dimensional approach to measuring momentary affect was the best method for the present study.

Conclusion

Overall, this study suggests that the use of visuals to exemplify action-related risk arguments can influence the degree to which readers recall information as well as make judgments of risk. By measuring negative affect as a mediator, the study also illustrates why an exemplar can influence recall and amplify risk perceptions. Most striking is that while negative affect mediated the effect on risk perception, it emerged as a stronger predictor than recalling specific risk arguments. Despite being exposed to conflicting risk arguments that could be used to weigh in on risk perception, people relied more strongly on their negative

affective reactions in judging risk likelihood and severity. From a practical sense, exemplifying risk arguments via emotional visuals can be a benefit and detriment. When exemplifying scientifically supported risk arguments with an emotional visual, consumers may be more likely to accurately perceive and estimate the risks (e.g., raw milk). On the other hand, exemplifying inaccurate or atypical risks may contribute to amplified risk perception toward low risk issues that are important for maintaining public health (e.g., vaccines). Journalists should therefore consider the appropriateness of including emotional visuals when reporting on controversial risk topics.

CHAPTER 4

AFFECTIVE AROUSAL AND ONLINE RISK INFORMATION SEEKING BEHAVIOR: THE ROLE OF EMOTIONAL EXEMPLARS IN ONLINE COMMENT READING

While the previous chapter examined the indirect effect of visual exemplars on two-sided message recall and risk perception, chapter 4 explores the indirect effect of visual exemplars and online information seeking behavior. Recent research has shown that user comments attached to the bottom of online news articles that make rude, insulting, or outrageous claims can have undesirable effects on health related attitudes (Shi et al, In Press) and risk perception (Anderson et al., 2013). As a result, many online news outlets have banned users from posting comments anonymously or have removed comments sections altogether (LaBarre, 2013). However, little research has examined whether consumers actually read user comments or whether message features within the news article, such as embedded visual exemplars, could influence consumers to read comments as an information seeking behavior. To fill this gap, an experiment was conducted in which participants (n=520) were randomly assigned to online news articles with an embedded negative visual exemplar or no visual exemplar. Participants could read user comments below the article by clicking on a link. Exposure to visuals aroused negative affect, which positively influenced online comment reading. The findings illustrate that the propensity to which online material elicits negative affect can influence how consumers use online features to seek information.

Introduction

With more people using the internet to seek information about health and risk issues (Pew Research Internet Project, 2013), scholars have expressed concern that popular online

features, such as user-generated comments, pose significant challenges for effective science and health communication. Recent research has found that uncivil comments attached to online articles and videos that provide rude critiques, name-calling, and outrageous claims can amplify risk perception surrounding low risk issues, such as nanotechnology (Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2013) and attenuate risk perception surrounding high risk issues, such as smoking (Shi, Messaris, & Cappella, In Press). Exposure to uncivil comments has also been observed to increase negative attitudes toward important health behavior, such as smoking cessation (Shi et al., In Press). Popular media, including science and engineering magazine *Popular Science*, have responded by dismantling user comments altogether in an effort to ensure their articles are untarnished by user incivility (LaBarre, 2013).

Despite emerging evidence on the effects of user comments, little research has examined whether online news consumers actually read user comments as well as determine what factors predict online comment reading. Information seeking research provides a pathway to address this issue. The risk information seeking and processing (RISP) model, for instance, illustrates cognitive and affective components as determinants of risk information seeking intentions and behavior (Griffin, Dunwoody, & Neuwirth, 1999). Recent research by Yang and Kahlor (2013) uncovered evidence linking negative affect to information seeking and positive affect to information avoidance. Although Yang and Kahlor (2013) measured affect as extended affect (i.e., a long-term feeling state about an issue; trait measure) and not on the momentary level (i.e., a short term feeling state often in response to a stimulus), their work poses an important question of how messages eliciting affective responses impact information seeking behaviors.

In addressing this question, this chapter examines the role of message features that elicit affective reactions in online consumer information seeking behavior. In particular, this study focuses on embedded visuals that exemplify parts of an online news story, and examines how their presence can indirectly influence online comment reading via affective reactions. Therefore, this paper connects research on the RISP model with the media effects theory of exemplification to explore the extent to which affect-inducing message stimuli indirectly influence online information seeking behavior. Additionally, by bridging the RISP model with exemplification, this chapter can determine what factors that play a role in whether online consumers choose to read user comments attached to an online news article.

Risk Information Seeking and Processing Model

Drawing from research on heuristic and systematic processing (Chaiken, 1980), risk perception research, mass communication, and behavioral prediction, the RISP model was designed to explain variability in how people process, seek, and avoid risk information (Griffin et al., 1999). Central to the RISP model is the concept that individuals seek information when they have high *information insufficiency* (i.e., the gap between one's current knowledge and the knowledge he/she believes is needed). Based off of the sufficiency principle of the heuristic-systematic model (Eagley & Chaiken, 1993), people are motivated to process information in an effort to improve confidence in their judgments, and people's appraisals of their information insufficiency is a direct determinant of information seeking. That is, the less perceived knowledge and greater need for knowledge people have about a particular risk issue, the more likely they will seek information on that topic. However, other factors play a role in this process. *Individual characteristics* of people, such as their demographic and social backgrounds, need for cognition (i.e., associated with deep

thought and a motivation to think critically, Cacioppo & Petty, 1982), and past experiences in seeking information, have an indirect influence on information seeking. For instance, gender, ethnicity, age, need for cognition, etc., directly shape *informational subjective norms* (i.e., a person's perception of what others' expect his/her knowledge should be regarding a particular risk issue). A strong perception of information subjective norm can then positively influence information seeking directly or indirectly, via information insufficiency. When informational subjective norms are high, individuals are more likely to develop information insufficiency and, as a result, seek risk information about that particular risk (Griffin, Neuwirth, Dunwoody, & Giese, 2008).

Individual characteristics also influence *perceived information-gathering capacity* Adapted from the Theory of Planned Behavior, (TPB; Azjen, 1991) PIGC suggests motivations to seek information are supported by self-efficacy to perform such an action. Perceived information-gathering capacity moderates the effect of information insufficiency on information seeking, in that information insufficiency influences information seeking when individuals perceive they have the ability to do so. A person's *relevant channel belief*, or attitude toward seeking information, moderates the effect of information insufficiency on information seeking in the same way.

While the aforementioned variables draw on cognitive elements of risk information seeking and processing and are directly influenced by individual characteristics, the RISP model also takes into account the role of affect – a positive or negative feeling state measured by arousal (Slovic et al., 2007). In particular, negative affect from risk appraisals can contribute toward information insufficiency, which in turn can influence information seeking. This occurs because emotion acts as a motivational mechanism that involves action tendency

and action readiness (Frijda, 2004). An anger reaction, for instance, might lead people to seek control of the situation by seeking more information (Griffin et al., 2008); fear reactions can lead people to seek information as a means of danger control if they have the efficacy to do so and their threat appraisal is high (Witte, 1994). Moreover, negative affect often spurs information seeking because, from an evolutionary perspective, an organism's ability to quickly detect and comprehend negative information supports its survivability (Ohman, 1988; Slovic, Finucane, Peters, & MacGregor, 2004). Recent research has found negative affect to directly influence risk information seeking behavior (Griffin et al., 2008; Kahlor, 2010), whereas positive affect has been associated with information avoidance (Yang & Kahlor, 2013). Specifically, Yang & Kahlor (2013) observed that worry, concern and anxiety (and overall negative feelings) toward climate change positively associated with information seeking about climate change. Excitement, hope, and happiness toward climate change (and overall positive feelings) positively associated with information avoidance about climate change.

Affect in RISP model: Momentary and Extended Affect

Despite evidence that affect indirectly influences information seeking/avoidance, RISP model studies have measured affect as an outcome of a person's cognitive appraisal of a risk (Yang & Kahlor, 2013) or uncertainty perception (Brashers, 2001). While the appraisal models can be useful for measuring *extended affect* (i.e., a long-term feeling state) toward particular risks or uncertainty in cross-sectional survey research (e.g., Yang & Kahlor, 2013), evidence suggests *momentary affect* (i.e., a short term feeling state that ebbs and flows moment by moment; Russell & Carroll, 1999) elicited by stimuli often *precedes* cognition and can play an important role in people's judgment and decision making. Notably, studies

have found that momentary affect occurs as a precognitive state that is formed automatically and subconsciously through a person's interaction with external stimuli (Zajonc, 1980). In this manner, affect does not occur due to cognitive appraisals but instead from a fast, instinctive and often subconscious response to external stimuli. Slovic et al. (2004), for instance, proposed that exposure to a stimulus leads individuals to search automatically and subconsciously for similar perceptual and symbolic representations of previously encountered stimuli that are tagged or marked by their affective qualities. Affective reactions can then influence how one perceives risk (Loewenstein, Weber, Hsee, & Welch, 2001) and makes decisions (Damasio, 2004). However, research examining the role of affective arousal elicited by stimuli in risk information seeking is limited. This paper, therefore, extends Yang & Kahlor's (2013) findings on extended affect and risk information seeking by examining the role of momentary affect elicited by visual stimuli in people's online risk information seeking behavior.

Exemplification and Affect

One type of visual that can elicit a strong affective response is an exemplar. In news media coverage of risk, visuals are often used to exemplify base rate information (i.e., statistical representation of risk) and provide an episodic frame that can elicit affective reactions (see Zillmann, 2006). For instance, a news article discussing the risk of influenza might include statistical risk information in the text but include a picture of an individual hospitalized with the flu. Mass media scholars have explored the role of exemplars in news-related information processing and risk perception. In particular, the presence of visual exemplars in news content can increase article recall and heighten risk perception, and embedded visuals that convey threats to health and safety lead toward greater systematic

processing in the form of more extensive and careful reading of the article (Knobloch, Hastall, Zillmann, & Callison, 2003; Zillmann, Gibson, & Sargent, 1999; Zillmann, Knobloch, & Yu, 2001). Negative affective reactions have also been observed to mediate these effects (Xie, Wang, Zhang, Li, &Yu 2011), suggesting exemplification effects can occur due to the visual's propensity to arouse affective reactions among readers.

Though exemplification research has focused primarily on information processing and risk perception, Zillmann (2006) raised the point that an embedded visual exemplar could impact consumers' information seeking intentions as well their specific online information seeking behavior. The presence of a visual exemplifying a risk argument might then play an important role in people's online information seeking behavior if it arouses a negative affective reaction.

Hypotheses

Guided by the aforementioned research on the RISP model and exemplification, this study proposes that the presence of a negative affect-inducing exemplar in an online news article will heighten risk information seeking intentions:

H1: Exposure to an online news article with a negative visual exemplifying a risk argument will heighten risk information seeking intentions.

In addition, controlling for individual characteristic variables, it is hypothesized that negative affect elicited by the exemplar will mediate the exemplar-information seeking intention effect:

H2: Exposure to an online news article with a negative visual exemplifying a risk argument will indirectly influence information seeking intention via negative affect.

It is also important to examine whether information insufficiency acts as a mediator of negative affect and information seeking intentions. Controlling for individual characteristic variables, it is hypothesized that negative affect predicts information insufficiency; this insufficiency then positively predicts intentions to seek risk information:

H3: Exposure to an online news article with a negative visual exemplifying a risk argument will arouse negative affect, which in turn predicts risk information seeking intentions by way of information insufficiency.

Lastly, this study examines the indirect effect of exemplar exposure on a specific information seeking behavior – reading online user comments. Guided by the aforementioned research on RISP, it is hypothesized that within an online news context, articles with an exemplar will indirectly influence comment reading by way of three mediators: negative affect, information insufficiency, and information seeking intentions. In particular, negative affect elicited by the articles with exemplars will positively predict information seeking intentions by way of information insufficiency. These intentions will then positively predict online comment reading.

H4**:** Exposure to an online news article with a negative visual exemplifying a risk argument will arouse negative affect, which will heighten information insufficiency; information insufficiency will positively influence information seeking intentions, which in turn will positively influence comment reading.

Methods

Using a general population sample supplied by Qualtrics[3], participants (n = 520; average age = 47.3, SD = 13.3; 65.4% female; 83.7% White) were randomly assigned to an online news article discussing one of two health related issues (raw milk or vaccination) and asked to read/browse the article in the way they would normally read/browse an online news article. After accessing their article, participants were asked to complete a short survey.

The online experiment consisted of a 2 article (raw milk or vaccine) by 3 condition (inaction exemplar, action exemplar, no exemplar) factorial design. Specifically, participants were randomly assigned using a built-in algorithm in Qualtrics to an online article about vaccination or raw milk that presented two-sided risk information: one side presented three arguments that it was risky to perform an action (i.e., drinking raw milk/receiving a vaccine); the other side presented three arguments that it was risky to not perform an action (i.e., not drinking raw milk/not receiving vaccine). The conditions consisted of either (1) including an emotional picture exemplifying an action-risk argument; (2) including an emotional picture exemplifying an inaction-risk argument; (3) or no picture. Below each article was a link to user comments, which participants could choose to click. Upon finishing their article, participants then completed a survey that measured affective reactions, information insufficiency, and information seeking intention. Individual characteristic variables were measured prior to condition assignment.

Participants were specifically told not to open other windows and to complete their survey in one sitting. Furthermore, selective attrition following treatment exposure (i.e.,

[3] Qualtrics drew a panel from sample frame closely mirroring U.S. Census data based on stratified quota method.

uneven dropout rates between conditions) was not detected. The study received IRB approval.

Materials

The articles were adapted from real articles about vaccination and raw milk risks and placed on a blog administered by the author. This was done so that the articles were situated within an online environment similar to an online news article. Each article was balanced in that it presented three arguments that vaccination/raw milk consumption is risky and three arguments that not vaccinating/not consuming raw milk is risky. The visual included a picture of a child lying on a hospital bed and hooked up to a ventilator. In one condition, a caption identified the child as being injured by the vaccine or ill from raw milk consumption (i.e., an action risk exemplar); the second condition identified the child as having a severe case of Pertussis due to non-vaccination or recovering from a severe asthma attack that could have been prevented by raw milk consumption[4] (an inaction risk exemplar); the third condition contained no picture and served as the control.

In addition, these articles included a clickable icon at the bottom of each article that stated there were five user comments (see appendix 4 for article layout). The user comments were obtained from actual online news articles about vaccination and raw milk. Participants could click on the icon to view the comments. Comments could only be viewed if participants clicked on the icon (comments did not automatically open up when participants accessed the webpage). Instructions for participants prior to the start of the experiment told them to browse/read their online article in the manner they normally read an online article.

[4] This is a common argument made by raw milk proponents who tout raw milk's ability to reduce the risk of asthma and behavioral problems in children (Masterjohn, 2012).

Comments were not mentioned in the instructions to the participants. Participants who clicked to read comments did so on their own volition.

Measures

Individual characteristics

The study included the following variables identified as important individual characteristic variables in RISP (Griffin et al., 1999): *Age* was measured via a fill in the blank item, whereas *gender* was measured with a binary response (1 = male; 0 = female). *Race* was measured using categories for White, Black, Hispanic, Asian, and Native American/Native Pacific Islander. *Need for cognition* was measured using a 10-item version of Cacioppo and Petty's (1982) scale (M = 4.23 SD =.76, Cronbach's α =.84).

Together, individual characteristic variables represent distal predictors of information seeking and RISP variables Information subjective norms, perceived information gathering capacity, and relevant channel belief. Individual characteristic variables were entered as covariates when examining negative affect and information insufficiency as mediators of information seeking intention and comment reading (see appendix 5 for surveys used).

Negative affect

After reading the article, participants clicked onto a new screen and were asked "how much of the emotions listed below did you feel from reading the news article?" Recall-based ratings of affective arousal, such as the one used in the present study, have been demonstrated to be accurate indicators of momentary affective experiences (see Barrett, 1997). This study employed a 4-item negative affect scale developed by Scollon, Diener, Oishi, and Diener (2005) that consisted of four discrete emotions – irritation, guilt, sadness, and worry – measured by the level of arousal (0 = not at all to 6 = maximum intensity).

These discrete emotions were selected by Scollon et al. (2005) because they represent the major forms of negative affect and evidence suggests they are experienced together at the momentary level irrespective of a person's cultural background (Diener, Smith, & Fujita, 1995; Scollon et al., 2005). Positive discrete emotions were not included in the survey since the available evidence supports that negative and positive affect do not occur at the same moment in time (Scollon et al., 2005). Scores for each discrete negative emotion were averaged for each participant. The scale achieved acceptable reliability (M = 2.76, SD = 1.2, Cronbach's α = .8)

Information seeking intention

Information seeking intention was measured using an adapted scale from Yang and Kahlor (2013) in which participants indicated their agreement with several items (6 point Likert scale 1=strongly disagree; 6= strongly agree). For the raw milk articles these items included: (1) I plan to seek information about raw milk in the near future, (2) I will try to seek information about raw milk in the near future, and (3) I intend to find more information about raw milk soon. For the vaccine article these items included: (1) I plan to seek information about vaccines in the near future, (2) I will try to seek information about vaccines in the near future, and (3) I intend to find more information about vaccines soon. Both achieved strong reliability (raw milk M = 3.35, SD = 1.5, Cronbach's α = .98; vaccine M = 3.71, SD = 1.5, Cronbach's α = .97).

Information insufficiency

Information insufficiency was measured using two items adapted from Yang and Kahlor (2013). Participants were asked to estimate their knowledge on raw milk or vaccination using a sliding scale (0 = know nothing; 100 = know everything you could

possibly know about the topic). Using the same sliding scale, participants were asked, "This time, using the same scale, estimate how much knowledge you think you NEED to know." The former item measures perceived knowledge, whereas the latter item measures information sufficiency threshold. In accordance with past RISP studies (see Yang & Kahlor, 2013), information insufficiency was measured using information sufficiency threshold as a predictor of information seeking with current knowledge as a covariate. The mediation analyses were performed in this manner.

Comment reading

Using a binary response item (1 = yes; 0 = no), participants were asked whether they had clicked on the link below the article to read the user comments.

Manipulation check

To ensure that participants read their article, participants were asked whether their news article contained a picture. Participants who incorrectly answered this item were removed from the study. Overall, a majority (85%) of participants correctly answered this question. In addition, the number of incorrect responses to this question did not significantly differ between the exemplar and control condition for both article types. With participants who incorrectly answered this item removed, the overall sample size was reduced to n=440[5].

Data Analysis

A factorial multivariate analysis of variance (MANOVA) was used with article type (vaccine or raw milk) and condition (exemplar vs. no exemplar) as fixed effects and negative affect and information seeking intention as dependent variables. The two exemplar conditions – inaction and action – were combined into one condition, given that the different exemplars produce the same level of negative affective reactions. A MANOVA was used due

[5] Results were the same when using the full population sample (n=520).

to expected moderate correlations between the dependent variables. However, separate univariate factorial ANOVAs were also administered with each dependent variable. A non-significant interaction between condition and article type is desirable, as it would suggest that differences between conditions occur in the same way for raw milk and vaccination articles.

Mediation analyses were performed using PROCESS (Hayes, 2013), which provides a point estimate and bias corrected 95% confidence interval for the indirect effects via bootstrapping. The point estimate confidence interval and bootstrapping procedure is advantageous in that the sampling distribution for the indirect effect is not assumed to be normally distributed (Preacher, Rucker, & Hayes, 2007). PROCESS also allows for a dichotomous independent variable and dependent variable. As a result, PROCESS allows for analyses that would not be possible with previous mediation methods.

Results

Individual characteristic variables (age, gender, need for cognition, and race) did not significantly differ between article type (vaccination vs. raw milk) and between condition (exemplar vs. control), indicating evidence of successful randomization. Secondly, negative affect scores for both exemplar types, inaction exemplar (M = 2.88, SD = 1.2), and action exemplar (M = 2.95, SD = 1.2), elicited the same degree of negative affect (p = .99), and were both significantly stronger than the control condition (M = 2.46, SD = 1.2, p<.001). Since both exemplar types elicited statistically the same degree of negative affect, articles containing exemplars were treated as the experimental condition, whereas articles without exemplars were treated as the control condition.

The MANOVA reported an insignificant Box's sphere of specificity value, suggesting there are no differences between covariance matrices, an important assumption

for multivariate analyses with unequal sample sizes (Box's M = 11.1; F = 1.2, p = .273). Overall, the factorial MANOVA observed significant main effects of article type (Pillai's Trace = .024. $F(2,435) = 5.5$, $p<.01$ $\eta_p^2 = .024$) and condition (Pillai's Trace= .033, $F(2,435) = 7.4$, $p<.001$, $\eta_p^2 = .033$). Interactions between article type and condition were non-significant (Pillai's Trace = .01, $F(2,435) = 2.1$, $p = .12$). This is an important finding because it suggests the exemplar conditions, irrespective of article type (raw milk or vaccination), influenced the dependent variables in the same manner. With the MANOVA assumptions satisfied and significant effects reported for the two main effects with combined dependent variables, the following hypotheses report the univariate ANOVAs of the main effects for each dependent variable.

Negative Affect

A main effect for article type (vaccine versus raw milk) ($F(1, 436) = 5.6$, $p<.05$, $\eta_p^2 = .013$) and condition (being in a condition with an exemplar versus no exemplar) was observed ($F(1, 436) =14.4$, $p<.001$, $\eta_p^2 = .032$). Specifically, participants exposed to articles with exemplars reported higher negative affect scores than those reading articles without exemplars.

Hypothesis 1

Hypothesis 1 predicted that being in a condition with an exemplar will heighten information seeking intention. A main effect of article type (vaccine versus raw milk) was observed ($F(1, 436) = 9.5$, $p<.01$, $\eta_p^2 = .022$). This indicates readers of the raw milk article reported significantly higher information seeking intention scores than readers of the vaccine article. However, there was not a significant main effect for condition (exemplar condition

versus no exemplar condition) ($F(1, 436) = 1.15$, $p = .285$). Therefore, hypothesis 1 is not supported.

Hypothesis 2

Hypothesis 2 predicted that exemplar exposure indirectly influences information seeking intention via negative affect. Although a significant main effect was not observed, Hayes (2013) and others (Rucker, Preacher, Tormala, & Petty, 2011) argue that one can detect indirect effects in the absence of a direct effect when using appropriate mediation tools. Using PROCESS model 4, the independent variable consisted of being in a condition with an exemplar (1= yes; 0 = no); the negative affect score as the mediator and individual characteristic variables as coviarates; and the information seeking intention score as the dependent variable. A significant indirect effect was observed, in that exposure to an article with an exemplar aroused a negative affective reaction (relative to control condition), which in turn positively predicted intention to seek information, even when controlling for individual characteristic variables (See Table 4.1). 1000 Bootstrapped 95% confidence intervals did not include 0 (B=.22; 95% CI= .09, .36), indicating a statistically meaningful indirect effect.

Hypothesis 3

Hypothesis 3 predicted that information insufficiency, as predicted in the RISP model, plays a mediating role in the effect of negative affect on information seeking intention. Specifically, it explains why negative affect leads toward greater information seeking intention. PROCESS model 6 was used to test whether the effect of negative affect on information seeking intentions is mediated by information insufficiency. A sequential mediation model was observed, in that exposure to an article with an exemplar aroused a

negative affective reaction (relative to control condition), which in turn positively predicted information insufficiency, even when controlling for individual characteristic variables. Information insufficiency was positively associated with intention to seek information about raw milk or vaccines (See Table 4.2). However, negative affect maintained a direct effect on information seeking intention even when information insufficiency was accounted for as a mediator. Therefore, people relied on their affective arousal in addition to their cognitive appraisal of their information insufficiency when forming their information seeking intentions. 1000 Bootstrapped 95% confidence intervals for the indirect effect of the sequential mediation do not include 0 (B=.06; 95% CI= .03, .12), indicating a statistically meaningful indirect effect. Therefore, hypothesis 3 is supported.

Hypothesis 4

The final hypothesis predicted that within an online news context, articles with a risk exemplar will indirectly influence comment reading by way of three mediators: negative affect, information insufficiency, and information seeking intentions. Using PROCESS model 6, a significant indirect effect was observed (B=.015; 95% CI= .002, .04) (see Table 4.3). Exemplar exposure significantly aroused negative affect. Negative affect, in turn, positively associated with information insufficiency. Information insufficiency and negative affect then positively associated with information seeking intentions. These intentions then positively associated with comment reading. Taken together, this direct path from stimulus exposure (i.e., exemplar) to information seeking behavior confirms that RISP works within an experimental and online information seeking context.

Table 4.1
Results from Mediation Analysis (Dependent Variable = Intentions to seek information about vaccines/raw milk)

Predictor	B Unstandardized coefficient
Equation predicting mediator (Negative affect)	
Intercept	**3.18*** **
Reading article with an exemplar	**.43*** **
Equation predicting dependent variable (intention to seek information)	
Intercept	**1.27*** **
Reading article with an exemplar	-.12
Mediator: Negative Affect	**.5*** **
Covariates: Age	-.01
Male	.03
Need for cognition	.**38*** **
Race (White coded high)	-.43

Note: Completely standardized indirect effect of exemplar exposure on information seeking intentions via negative affect (B=.22; 95% CI= .09, .36). * $p<.05$ ** $p<.01$ ***$p<.001$

Table 2.
Results from Mediation Analysis (Dependent Variable = Intentions to seek information about vaccines/raw milk)

Predictor	B Unstandardized coefficient
Equation predicting mediator 1 (Negative affect)	
Intercept	**3.2*** **
Reading article with an exemplar	**.43*** **
Equation predicting mediator 2 (information insufficiency)	
Intercept	**37.9*** **
Reading article with an exemplar	-2.1
Mediator 1: Negative Affect	**7.52*** **
Covariates: Age	.03
Male	-1.6
Need for cognition	**3.9***
Race (White coded high)	**-21***
Equation predicting dependent variable (intention to seek information)	
Intercept	.56
Reading article with an exemplar	-.07
Mediator 1: Negative Affect	**.33*** **
Mediator 2: Information insufficiency	**.02*** **
Covariates: Age	-.01
Male	.07
Need for cognition	**.27*** **
Race (White coded high)	-.07

Note: Completely standardized indirect effect of exemplar exposure on information seeking intentions via negative affect and information insufficiency (B=.06; 95% CI= .03, .12).* $p<.05$, ** $p<.01$, *** $p<.001$

Table 3.
Results from Mediation Analysis (Dependent Variable = Reading online user comments)

Predictor	B Unstandardized coefficient
Equation predicting mediator 1 (Negative affect)	
Intercept	**3.2*** **
Reading article with an exemplar	**.43*** **
Equation predicting mediator 2 (information insufficiency)	
Intercept	**37.9***
Reading article with an exemplar	-2.1
Mediator 1: Negative Affect	**7.52*** **
Covariates: Age	.03
Male	-1.6
Need for cognition	**3.9***
Race (White coded high)	**-.21***
Equation predicting mediator 3 (information seeking intentions)	
Intercept	.56
Reading article with an exemplar	-.067
Mediator 1: Negative Affect	**.328*** **
Mediator 2: Information insufficiency	**.02*** **
Covariates: Age	-.007
Male	.07
Need for cognition	**.27*** **
Race (White coded high)	-.07
Equation predicting dependent variable (reading comments)	
Intercept	**-4.2** **
Reading article with an exemplar	.39
Mediator 1: Negative Affect	.13
Mediator 2: Information insufficiency	-.004
Mediator 3: Information seeking intentions	**.23***
Covariates: Age	-.001
Male	-.09
Need for cognition	.23
Race (White coded high)	.03

Note: Completely standardized indirect effect of exemplar exposure on comment reading via negative affect, information insufficiency, and information seeking intention (B=.015; 95% CI= .002, .04). * p<.05, ** p<.01, ***p<.001

Discussion

This study provides experimental evidence that message features, particularly visual exemplars, indirectly influence online information seeking behavior. Negative affect elicited by the presence of an exemplar played an important mediating role in this relationship, even when controlling for individual characteristic variables. Furthermore, a partial sequential mediation was observed for information seeking intentions when accounting for information insufficiency as a sequential mediator. That is, negative affect still maintained a significant direct effect on information seeking intentions even when information insufficiency was accounted for as a mediator and individual characteristic variables were used as controls. This finding indicates that in addition to their cognitive appraisal of their information insufficiency, people relied on their affective arousal when forming their information seeking intentions. The mediation model also demonstrates that a negative affective reaction toward a message stimulus provokes information seeking intentions in the same way as extended affect that is drawn from cognitive evaluations of risk as documented by cross sectional research on the RISP model (e.g., Yang & Kahlor, 2013). This finding illustrates a unique contribution to the RISP model by providing evidence that a short-term affective reaction elicited by a visual can have the same effect on risk information seeking as appraisal-based extended affect.

Additionally, this study extends the RISP model in an important way by highlighting actual information seeking behavior within an online context. From a practical perspective, the findings suggest that the way in which online news material is presented and responded to by consumers can affect online information seeking behavior. For instance, negative affect elicited from reading the articles (and driven by the presence of an exemplar) indirectly

influenced comment reading by way of information insufficiency and information seeking intentions. In particular, the effect of negative affect on comment reading was fully mediated by information insufficiency and information seeking intention – a pathway predicted in the RISP model.

Lastly, this study extends exemplification theory by showing emotional exemplars not only influence recall and risk perception, but also the degree to which individuals seek further information about a risk topic. Affective reactions toward these exemplars, moreover, appear key to their influence on information seeking in that they indirectly influence information seeking behavior due to their ability to elicit affective arousal. While these results show promise, future research could use experiments that manipulate exemplars eliciting neutral and positive affective reactions to see how they relate to information seeking. Based on the RISP model, exemplars eliciting positive affect are predicted to lead to information avoidance and affectively neutral exemplars might be ineffective in provoking information seeking intentions and behavior.

Future Research: Exploring Effects of User Comments

Although recent research has observed user comments can negatively influence readers' science and health perceptions (Anderson et al., 2013; Shi et al., In Press), there is great potential for further study. This is important, as several popular media outlets (e.g., *Popular Science*) have decided to remove comment features from their websites in direct response to emerging studies on user comment effects (LaBarre, 2013). On the one hand, banning user comments can ensure the integrity of the article by showcasing science and health information that is supported by a strong scientific and medical consensus and represents important public health and environmental issues (e.g., climate change or

vaccination issues). User comments that inject doubt on scientific issues like climate change could then heighten uncertainty around certain scientific issues and foster an erroneous perception of a scientific divide when none exists (Dixon & Clarke, 2013). Therefore, limiting user comments can be viewed as a reasonable action for effective science and health journalism.

On the other hand, comment features transform news articles into a social experience in which readers interact with others and provide commentary and feedback on the article's content, the author(s), and the news organization that produced it. Outright bans on user comments might have unintended effects for online speech in general and health and science communication in particular. It is therefore important to consider the strengths and weaknesses of user comments and explore whether certain factors play a role. For example, future research could examine a combination of factors, including message features that influence comment reading, comment (in)civility, and comment anonymity. Drawing from work by Walther, DeAndrea, Kim, and Anthony (2010) that suggests the effect of a comment depends on whether a reader socially identifies with the commenter (and anonymity produces the greatest effect on social identification), it could be that the combination of a negatively arousing exemplar, along with scientifically inaccurate anonymous comments, produces the strongest negative effect on risk perception and scientific certainty. On the other hand, a negatively arousing exemplar that influences greater comment reading, along with scientifically accurate anonymous comments, could produce the strongest positive effect and influence positive science and health perceptions.

With online media organizations choosing to remove user comments completely and barring anonymous-only posting in response to a handful of studies highlighting potential

negative effects, research on online user comments can have a profound impact on media policy decisions. It is therefore incumbent on communication scholars to examine the nuanced effects – both the good and bad – of online user comments on science and health journalism and open up discussions with journalists and media organizations on the appropriateness of allowing comment features in online articles. While much of the research has explored the effects of user comments, these studies have made little to no effort in exploring whether readers actually read user comments and whether the way in which online news articles are presented and framed can indirectly influence consumers to read user comments. Before news organizations make sweeping decisions regarding online speech, more research should examine the generalizability of recent findings on comment effects as well as expand this chapter's research on the factors that influence consumers to read online comments.

Limitations

Although the study reported significant findings, there are important limitations to note. First, hypothesis 1, which predicted that exposure to an exemplar will directly lead to greater information seeking intentions, was not supported. This finding could be due to a number a factors, such as having low statistical power for detecting a small effect size. However, the lack of a total direct effect does not preclude the use of mediation. Hayes (2009) and others (Rucker et al., 2011) have argued that achieving a total direct effect is not necessary in order to proceed with tests of indirect effects. There are several reasons for why this is allowed. First, direct effects often need larger sample sizes to be detected due to their small to medium effect sizes, but indirect effects can be detected using smaller samples. To illustrate this point, Rucker et al. (2011) ran simulations using total effect sizes weighted by

their magnitude (small to large) and sample sizes per cell ranging from small (*n*=25) to large (*n*=200). The simulations reported that when the total effect is underpowered, significant indirect effects can still be observed. In fact, indirect effects in the absence of a total effect were detected nearly half the time using sample sizes typical of social psychology research. Second, a significant indirect effect can be detected in the absence of a direct effect when the independent variable has a stronger influence on the mediator than with the dependent variable. This seems to have occurred in the present study – the exemplar elicited a negative affective reaction that was stronger than its effect on information seeking intention.

Another important limitation is that while this study tested key features of the RISP model in an experimental setting, it only examined the basic pathway of negative affect on information seeking. RISP variables such as perceived information-gathering capacity, relevant channel belief, informational subjective norms were not included. However, individual characteristic variables that shape the above variables were included as controls – a procedure used by Hovick et al. (2011) in testing the RISP pathway between risk perception and systematic processing. Future experimental research can expand the scope of the present study's findings by measuring how the aforementioned variables moderate the exemplar to comment reading mediation. For instance, the effect of negative affect on comment reading might be highest for individuals who hold favorable attitudes toward information seeking, have a strong perceived information gathering capacity, and perceive that others expect them to be knowledgeable about the risk.

It is also important to note that the present study measured affect as a scale of four negative emotions rather than focusing on a single discrete emotion, such as anger or worry. While debate has centered on whether emotions occur as a dimensional valence (positive

versus negative) or only one discrete emotion at a given time, research suggests that either forms of emotion (dimensional and discrete) can occur, but that it depends on how an individual reacts to a particular stimulus (Barrett, 1997; Vansteelandt, Mechelen, & Nezlek, 2005). On the one hand, a stimulus might elicit primarily one discrete emotion, such as anger or fear, at the momentary level, whereas a different stimulus might elicit dimensional or valenced reactions such that different discrete emotions are experienced *together* at the momentary level. The present study found evidence of the latter, in that the exemplar scale measured strong reliability. Furthermore, the affect scale developed by Scollon et al (2005) was validated as a valenced scale, with evidence that the four discrete negative emotions co-occurred among a multi-cultural population sample. Based on these findings, a valenced approach to measuring momentary affect was the best method to use in the present study.

Lastly, the online nature of this study warrants discussion surrounding validity and reliability. To date, studies have observed no differences between lab and online responses for a variety of research topics, including message recall (Saunders, Bex, & Woods, 2013) and judgment and decision making (Berinsky, Huber, & Lenz, 2012; Paolacci, Chandler & Ipeirotis, 2010). Habitual survey-taking and participant cross-communication is also rare, and participation interest is driven by payment, not the topic of the (Berinsky et al., 2012; Chandler, Mueller & Paolacci, In Press). To that end, online experiments are a valid and reliable method of study for experimental social science research.

Conclusion

Overall, this study provides evidence that exemplars indirectly influence online information seeking behavior. RISP model variables emerged as significant mediators, indicating that the model can be applied to experimental contexts involving manipulated

stimuli. In the present study, the manipulated stimuli –visual exemplars – elicited negative affective reactions, which in turn positively influenced online information seeking behavior. From a practical perspective, the findings illustrate that the way in which online content is presented can indirectly influence how consumers seek information and use online features.

CHAPTER 5

CONCLUSION AND FUTURE RESEARCH

Dissertation Reflection

Tying together the two empirical studies, this dissertation investigated the indirect effects of visual exemplification of controversial health risks via negative affect. Specifically, the dissertation examined exemplification theory in two ways. First, the dissertation explored outcomes of exemplification that have been rarely measured, such as two-sided message recall and risk information seeking, and incorporated models and theories from psychology and risk perception research in an effort to understand the mechanisms behind the effects. In the case of two-sided message recall and risk perception, much of the research has been directed toward one-sided messages. The novelty of focusing on two-sided, conflicting messages of risk is two-fold. First, news media tend to report on controversial science and health topics in balanced ways as a means of maintaining objectivity, fairness, and impartiality. Within these balanced reports, however, journalists often exemplify only one of the two conflicting sides being discussed. By measuring the effects of uneven exemplification in two-sided messages, the dissertation highlights the effects of normatively-driven reporting styles on risk information processing, risk perception, and information seeking. Second, situating exemplars within a two-sided message can improve the explanatory power of exemplification theory by demonstrating that exemplars influence people's message recall, risk perception, and information seeking behavior even when conflicting textual information is present. In the case of information seeking, the RISP model provided a pathway to address exemplification theory's effects on information seeking behavior, and highlighted affect as an important mediator. Connecting the RISP model to

exemplification also extended the explanatory power of the RISP model by demonstrating the role of momentary affect elicited by a message stimulus in risk information seeking behavior and by examining an actual information seeking behavior (i.e., online comment reading); not just intentions to seek information.

In addition to exploring new dependent variables, such as two-sided message recall and risk perception, and risk information seeking behavior, the dissertation also investigates negative affect as a mechanism of exemplification effects. Affect, while posed by scholars as a potential mechanism of exemplification effects, has not been extensively tested using statistical mediation. To fill this gap, this dissertation tested the degree to which affect elicited by an embedded exemplar mediates the direct effects on message recall, risk perception, and information seeking. By highlighting affect as a mechanism of exemplification effects, the dissertation also incorporated psychological theories on affect primacy and the affect heuristic with exemplification theory. To that end, the dissertation not only presents evidence of negative affect as a significant mediator but also situates its findings within established psychological theories.

Overall, the studies report that the presence of an exemplar in a two-sided article on conflicting risks can have a significant effect on people's message recall, risk perception, and information seeking behavior. In chapter 3, it was hypothesized that exemplifying one side of a two-sided risk message can lead to greater recall of the side exemplified and that negative affect acted as the mechanism of the effect. The hypothesis received partial support, in that exposure to an embedded action risk exemplar associated with recalling more action risk arguments, with negative affect mediating the effect. However, exposure to an embedded inaction risk exemplar did not significantly predict recalling more inaction risk arguments.

Interestingly, the articles with embedded inaction risk exemplars did not elicit a negative affective reaction. Because negative affect mediated the effect with action risk exemplar articles only, the failure of the inaction risk conditions to influence recall could be due to the conditions not eliciting an affective reaction. The results were similar when measuring risk perception: the articles with an embedded action risk exemplar resulted in significantly higher action risk perception scores than the other conditions, with negative affect mediating the relationship. Furthermore, negative affect emerged as a stronger predictor of risk perception than recall of risk arguments. This finding suggests that people relied more on their affective reaction toward the news article, which was greatly influenced by the presence of an action risk exemplar, than their recall of actual statistical risk arguments present in their article when making judgments of risk.

In addition, chapter 3 found that embedded visuals that exemplify inaction risk arguments – i.e., that it is risky to not perform an action – did not elicit negative affective reactions as well as increase inaction risk perceptions. On the one hand, this finding provides strong evidence of negative affect's role in exemplification effects on risk perception: the exemplars that influenced risk perception directly also elicited negative affect; exemplars that did not influence risk perception did not elicit an affective reaction. On the other hand, this finding illustrates the challenges scientists and public health officials face when trying to communicate inaction risks to the public. For instance, health officials have suggested that highlighting the consequences of non-vaccination can effectively communicate the importance of vaccination and discount fears that vaccines cause severe side effects (see Offit & Coffin, 2003). However, simply embedding a vivid picture that exemplifies the consequences of not performing an action (e.g., a child having whooping cough due to not

receiving the DTaP vaccine) does not translate into the same effects observed for action risk exemplars, as observed in this dissertation. While the specific reason for the null finding could not be identified in the dissertation, it is possible that a more vivid exemplar than the one used in the study could elicit a negative affective reaction, thus amplifying inaction risk perception. Furthermore, dispositional factors within the sample population could also have played a role in the null finding for the inaction risk condition, such as participants having greater familiarity with the inaction risks than with the action risks. For instance, participants might have been more familiar with the action-risk arguments either due to repeated exposure via media or through interpersonal communication. Similar to the research on repeat exposure to media violence (Cline, Croft, & Courier, 1973; Griffiths & Shcukford, 1989; Linz, Donnerstein, & Adams, 1989; Smith & Donnerstein, 1998), familiarity with certain risks might then desensitize participants to vivid images, resulting in little to no negative affective arousal. Although not measured in this dissertation, future research could include measures of risk familiarity to determine whether familiarity interacts with affective arousal toward risk messages in general, and visual risk exemplars specifically.

Another explanation for the asymmetry in affective reactions toward the action and inaction risk exemplars, as discussed in chapter 3, could be explained by participants' perception of attribution of responsibility. People might feel less responsible for the risks of vaccine/raw milk inaction provided they perceive that external factors can also cause the risk. On the other hand, people might perceive greater responsibility for the risks of vaccination or drinking raw milk because they perceive that the act of vaccination or raw milk consumption (internal attribution) is the sole cause of the purported risk. If they perceive internal factors as the primary cause of the risk (i.e., vaccination is directly the cause of the reported side

effects), people might feel more responsible for consequences of choosing to vaccinate/consume raw milk. This finding could explain why the inaction exemplar failed to produce a significant effect on affect and risk perception, whereas the action risk exemplar did.

For public health officials wanting to more effectively communicate the risks of selective non-receipt of vaccination, the use of visual exemplars is perhaps not an easy fix as some may believe. To address this issue, more research examining ways that inaction risk exemplars effectively communicate inaction risk perception should be explored, with careful attention paid to mediating (i.e., affect) and moderating (i.e., individual differences) factors. Moreover, future research that measures participant's attribution of responsibility could determine whether causal attribution explains the asymmetry between exemplar types observed in Chapter 3. If attribution emerges as a significant explanation for the null effect, additional research could examine ways of overcoming this asymmetry such that inaction risk exemplars produce similar effects as inaction exemplars. To do so, communicating inaction risk, particular as it relates to vaccination, might involve framing the risk as an internal attribution – that is, emphasizing that the consequence of non-vaccination (i.e., disease) is primarily caused by choosing to not vaccinate, rather than from external causes.

Chapter 4 examined the influence of exemplars on information seeking behavior by integrating exemplification theory with the RISP model. Specifically, it was hypothesized that exposure to affect-inducing message content, such as an embedded visual exemplar, will arouse negative affect and influence information seeking. Unlike previous research on RISP, the dissertation study in chapter 4 involved manipulating affective content and examined actual information seeking behavior (i.e., online comment reading). In particular, it was

observed that when controlling for individual characteristic variables, exposure to exemplars elicited negative affect, leading to greater information insufficiency and information seeking intentions, which in turn positively influenced online comment reading. This finding sheds new light on whether message features, such as exemplars, can play a role in how news consumers use online features to search for more information. Much of the research on online comments makes little attempt to understand why consumers read user comments attached to news articles, instead focusing on the effects of comments (e.g., Anderson et al., 2013; Shi et al., In Press; Walther et al, 2010). Findings from chapter 4 suggest a more nuanced approach toward researching online comments by demonstrating that (1) not everyone reads user comments and (2) the way in which a news article is framed and presented might influence whether people read online comments.

Challenges of Communicating Science and Risk

In addition to extending theory on risk perception, information seeking, and information processing, the findings from this dissertation underscore the challenges of communicating science, health, environment, and risk. It was observed that embedding an action risk exemplar in a two-sided risk article, irrespective of its scientific accuracy, can lead to increased recall of action risk arguments and heighten ones' action risk perception. While this result might be desirable when risk managers and public officials want the public to increase recall and risk perception surrounding an issue deemed risky and important for public understanding, exemplifying action risk for an issue that is low risk and important for maintaining public health could be problematic. For the DTaP vaccination, where the available evidence strongly supports its safety and efficacy, choosing to embed a visual that exemplifies arguments that the vaccine is risky to receive can amplify risk perceptions, which

could contribute toward greater public uncertainty toward and lower intentions for receiving the DTaP vaccine specifically and/or vaccinations in general. In fact, research connecting media coverage with vaccine decision-making has observed that the way in which vaccination stories are reported, such as providing balance to whether the MMR vaccine causes autism, can heighten readers' uncertainty around established vaccine facts (Dixon and Clarke, 2013a) and lower vaccine intentions (Dixon and Clarke, 2013b). Survey work has also found that following media reports of the autism-vaccine controversy in the late 1990s, public confidence around vaccination declined (Lewis and Speers, 2003), while selective non-receipt of vaccines increased in some localities in the U.K (Hawker et al., 2007; Mason and Donnelly, 2000). Epidemiological research has also observed that non-medical exemption rates for school immunizations have increased across the United States from 2005 to 2011 (Omer, 2012). Given these findings, the use of visuals to exemplify inaccurate or atypical vaccine risk information in news media could contribute to the decline in public confidence surrounding vaccination and increases in non-medical exemption rates. It is therefore incumbent on journalists to consider the necessity of using visuals to communicate inaccurate or atypical risk information. However, reshaping long-held journalistic practices poses many challenges and can often have unintended consequences.

Journalistic norms have great influence on how news is reported and suggesting that journalists revoke long-held norms will unlikely be met with open arms. Balance, for instance, allows journalists to maintain perceptions of fairness by ensuring they present multiple views of an issue; impartiality in that they are not advocating for one side or another; and objectivity in that they are providing consumers the many viewpoints that exist in the world. From an economic perspective, balance also can help create compelling news

that sells because it highlights conflict and controversy. At the same time, the personification norm compels journalists to humanize news which often manifests via the use of emotional content.

While this dissertation provided evidence that reliance on journalistic norms can lead to amplified risk perceptions surrounding low risk issues, as in the case of the DTaP vaccine article, policy aimed to correct this problem requires careful attention. For example, Dixon and Clarke (2013a, 2013b) noted that although presenting two conflicting views can heighten uncertainty around an established scientific view and decrease people's intentions to have their future children vaccinated, it can be problematic for journalists to respond by choosing to report on only one side of the story. In wake of Dixon and Clarke's (2013b) study being published, science journalists, such as Rachel Dunlop from *The Guardian* (2013) weighed in and suggested that journalists should refrain from presenting the "anti-vaccine" viewpoints alongside views that are scientifically-supported. However, advocating that journalists exercise prior restraint regarding certain viewpoints in contentious health and science stories would set a dangerous precedent that threatens objective reporting, impartiality, and fairness, but perhaps more important, public health. For instance, severe vaccine side effects, while extremely rare, do occur and have important health policy implications. Recent research reported that Pandemrix, an influenza vaccine distributed in Europe, was associated with an increased risk of narcolepsy among children in Europe (Miller et al., 2013; Partinen et al., 2012; Persson et al., 2014). Despite compelling evidence that the vaccine posed considerable risk toward children, the principle scientist involved on the project expressed concern about going public with the results, fearing ridicule from her colleagues in the scientific field. This situation occurred when Andrew Wakefield, the doctor who sparked the controversy

surrounding purported link between the MMR vaccine and autism, had his medical license revoked in the U.K. and his *Lancet* paper formally retracted. While Wakefield's work on the autism-vaccine controversy has been linked to ethics violations, including fraud, the Pandemrix case was built on rigorous methods and ethical practices. However, as discussed by Columbia Journalism Review science writer Curtis Brainard (2013), the professional excommunication of Wakefield produced a chilling effect that might impact whether scientists report potentially dangerous side-effects of vaccinations in the future. This occurred with the principle scientist involved with Pandemrix and as Brainard suggested, and evidenced by Dunlop's arguments, the same degree of hesitancy to report on vaccine risk could occur among journalists.

Since news media are important sources of health risk information, journalist self-censorship of risk viewpoints could dangerous, especially if these risks turn out to be scientifically-supported. Therefore, how can journalists present multiple sides of an issue and use emotional exemplars while also conveying accurate risk information?

Creating recommendations for improved risk reporting that allows for journalists to adhere to journalistic norms, but at the same time more accurately convey scientific information, is a challenging endeavor. Recent research has explored this issue, examining whether journalistic balance can be presented for controversial topics such that it does not lead readers to erroneously perceive a scientific divide when one does not exist. Specifically, Clarke et al. (In Press) tested whether including evidentiary context in a balanced article on the autism-vaccine controversy improved readers' certainty that vaccines are not linked to autism when compared with balanced articles without the added consensus information. Evidentiary context draws on two-sided messaging research by inserting a refutational

message that makes the reader aware that while there are two sides to a certain controversy, only one is supported by evidence and a scientific consensus. Clarke et al.'s (In Press) study observed that while the inclusion of evidentiary context improved scientific certainty surrounding vaccine risk, it had the strongest influence on individuals who had strong deference to scientific authority, suggesting that simply filling a person's deficit in scientific knowledge with consensus information will not necessarily translate into greater acceptance of a scientific or health related issue. Individuals who do not defer to scientists due to a lack of trust might not be readily persuaded by consensus information. However, recent research published in *Nature Climate Change* (Lewandowsky et al., 2013) found consensus information to be influential in people's acceptance of climate change. Specifically, they found that providing consensus information on climate change – a pie chart that stated 97% of scientists agree that climate change is occurring and is human caused – positively influenced people's acceptance of anthropogenic climate change and attenuated the effect of people's free-market world view on their beliefs around climate change.

Perhaps communicating a scientific consensus via visuals – as in the case of Lewandowsky et al (2013) – produces an effect that overcomes ideological biases? Research examining visual depictions of evidentiary context – such as depicting a scientific consensus surrounding a view - could shed new light on the ways of improving science and health communication. Drawing from work in exemplification theory and visuals, future research could more precisely identify (1) whether visual depictions of evidentiary context have a stronger effect than textual depictions of evidentiary context on scientific certainty, risk perceptions, etc., (2) whether a specific visual type reigns supreme in influencing scientific/risk perceptions, and (3) whether certain visual types can overcome ideological

biases that moderate the effect of text-based consensus information. For example, in a balanced news article about a controversial issue (e.g., climate change or the autism-vaccine controversy), a photograph of a group of scientists used to illustrate a scientific consensus could elicit a stronger belief of scientific certainty than a photograph of one scientist or a graphical visual because it elicits a stronger representativeness heuristic regarding views within the scientific community. Specifically, participants exposed to an article with a photo of a group of scientists might rely on that photo as a heuristic in making judgments about the scientific support for a particular view. Photos of a single scientist or a graphical representation might produce a smaller effect because (1) a photo of a single scientist, via the quantification heuristic, is viewed as a small representation of scientists, and (2) graphical representations that contain statistics might not elicit a representativeness heuristic at all. Via exemplification theory, it would be hypothesized that participants would be more affected by a photograph of a group of scientists rather than a single scientist or of a graphical representation. However, could visualizing consensus information with a photo of a group of scientists elicit the same response for all participants, regardless of their ideological differences? Including variables measuring participants' ideology toward science (i.e., deference to scientific authority) in the proposed study could address whether a particular visual depiction of consensus information is more or less effective for people with different ideologies – ideologies that already significantly influence their risk perceptions, acceptance, and judgments of polarizing science and risk issues like climate change, gun control, and vaccination (Kahan, 2012). This research can provide new theory-based approaches to communicating consensus information via exemplification theory by highlighting the role of visuals as well as identify more precisely the boundary conditions that exist for different

types (visual and textual) of consensus information to positively influence scientific attitudes, beliefs, and certainty. Studies such as these could be used to create toolboxes that can help journalists identify methods for reporting on science and health stories in more accurate ways.

Policy Implications on Health Marketing

While this dissertation has so far focused on journalism practice, its findings could also have policy implications on health marketing. Similar to journalistic balance, direct-to-consumer (DTC) prescription drug advertisers are required by the Food and Drug Administration (FDA) to present accurate information and contain a "fair balance" of both drug risks and benefits in their advertisements (21 CFR 202.1[e][5]ii][1997]). An advertisement is deemed to not be balanced if (1) information about effectiveness and health benefits is presented in greater scope, depth or detail than negative side effects; (2) it fails to provide sufficient emphasis on the negative side effects; (3) it fails to present information about negative side effects and contraindications with enough depth and easy-to-understand material (Royne & Myers, 2008). Fair balance is also supported by PhRMA, a trade group that represents the pharmaceutical and biomedical industry, which in 2009, included guidelines that risk and safety information be "presented with reasonable comparable prominence to the benefit information, in a clear, conspicuous and neutral manner, and without a distraction from the content" (Yan, 2009).

Despite these requirements, content analyses of prescription drug advertisements find that less attention is given to a drug's risks relative to benefits (Main et al., 2004; Avery et al., 2012), less time is devoted to a drug's risks relative to its benefits (Kaphingst & Dejong, 2004; Kaphingst, Dejong, Rudd & Daltroy, 2004; Kaphingst et al., 2005), and risk

information is often presented with voiceover (Macias et al., 2007). Royne and Myers (2008) also infer that the visual stimuli and background music can influence consumers' processing of risk information such that they may only be able to recall the positive attributes of the drug over the risks. Indeed, this dissertation found that uneven use of a visual can lead to uneven recall and amplified risk perception. Such an effect might also occur with balanced prescription drug advertising. However, instead of drawing attention to a drug's risks or side effects via negative affective stimuli, prescription drug advertisers want to highlight the benefits of the drugs as much as possible while still maintaining the FDA's fair balance requirement. Drawing from information processing research that discovered that images eliciting positive affect resulted in less systematic processing of central details of the image (Yegiyan & Lang, 2010), it is almost certain that health marketers strategically use strong positive affective imagery and audio as a means of influencing audience's to process less risk information. While this advertising strategy is not particularly surprising, it could indicate that simply presenting the risks and benefits of prescription drugs does not fulfill the requirements of fair balance. Instead, fair balance might require greater symmetry between presentation formats such that risks and benefits are both free of message features that can bias information processing.

Studies attempting to improve risk communication in DTC prescription drug advertising have identified the use of multiple modalities (audio and visual) to communicate a drug's risk (Wogalter, Shaver, & Kalsher, 2013) and appending risk information at the end of the advertisement (Glinert & Schommer, 2005) to improve recall of risk information. However, research has not yet explored the role of affective arousal and DTC information processing, particularly the role of positive affective imagery and audio used during the

communication of a drug's risk information. A study that manipulates the affective nature – either positive, negative, or neutral – of a voice-over, in addition to the background images – positive, negative, or neutral – could determine the degree to which affect plays a role in DTC risk communication. Furthermore, this research could also be combined with the aforementioned studies on dual modalities to determine which manipulation – affect or multiple modalities, or combinations of the two – most effectively convey a prescription drug's risks.

Future Research

Although this dissertation provides clear evidence of the mechanisms behind several exemplification effects, there are still research gaps worth studying in the future. First, the findings in this dissertation can only be generalized to two types of health risk controversies – vaccination and raw milk – as well as two types of exemplars – action and inaction risk. Other risk controversies could elicit different reactions among participants, especially for highly politicized controversies, such as climate change. Cultural cognitions, whereby people's ideological biases toward contentious issues influences their risk perceptions, could play a role in their reactions to exemplars. Work by Kahan (2012) has examined the role of cultural cognitions regarding climate change risk perceptions, finding that different worldviews can moderate the effect of climate change communication. Specifically, people with different ideological worldviews respond to the same climate change messages in different ways. This suggests that message features do not necessarily work the same for every person and that long-held cultural worldviews can play a significant role in people's risk perceptions. Based on these findings, using visual exemplars as persuasive tools for politically contentious risk issues might only work for people with specific worldviews, such

as those who hold strong deference to scientific authority, left-leaning political ideology, etc, but not for those whose world views suppress persuasive attempts at changing risk perceptions. Future research could more precisely identify the boundary conditions of the effects of emotional exemplars for different risk topics and for applied health and risk communication purposes, test ways of overcoming biases related to cultural cognitions.

Future research could also explore how the effects documented in this dissertation change overtime. Affective reactions to the two-sided messages might be more accessible and might increase the degree of uneven recall as time progresses. In fact, Zillmann and Gans (1996) reported that emotional exemplars had the greatest effect on recall when participants were measured at later times rather than immediately following stimulus exposure, reasoning that emotional reactions dominate the mind more as time passes. Although the dissertation studies observed recall effects to occur immediately following stimulus exposure, the effects might be more pronounced if measured an hour, a day, or even a week later.

Exposure to exemplars could also have priming effects on people's subsequent media use. Recent research has shown that people who have been negatively primed are more likely to recall negative information than positive information in subsequent news articles; people who had been positively primed were more likely to recall positive information than negative information in subsequent news articles (Baumgartner and Wirth, 2012). While the action risk exemplar in the dissertation led people to recall more action risk arguments than inaction risk arguments, its effect could extend to how people process subsequent news articles much in the same way as observed by Baumgartner and Wirth (2012). For instance, a study could involve exposing participants to a news article containing an affective exemplar (either positive or negative) and then present them subsequent news articles. Those exposed to

exemplars eliciting negative affect might then be more likely to recall negative information in subsequent news articles. Those exposed to exemplars eliciting positive affect might then be more likely to recall positive information in subsequent news articles. Overall, this research will show that the types of messages used in news media can affect how one processes subsequent news stories and that affect plays an important role.

Additionally, future research could examine other information seeking behaviors to determine the degree of specificity with which an exemplar can influence the information one seeks. For instance, embedding an action risk exemplar might lead to greater action risk related information seeking. For vaccination, the presence of an action risk exemplar might spur readers to seek information about the risks of receiving a vaccine, not just vaccination in general. Exemplars might then direct people's general information seeking intentions toward more specific topics.

Conclusion

Overall, this dissertation provides a meaningful step forward in understanding the complex nature of risk communication. Evidence from the dissertation studies suggests the use of exemplars in risk communication can influence how people recall, perceive, and seek information on risks within the context of two-sided messages. Negative affect, moreover, plays an important mediating role, confirming previous research in risk perception and psychology. Together, findings from the dissertation help identify sources of distortions in risk perception, while also pointing toward future research that can address challenges journalists and practitioners face in communicating important risk issues to the public.

APPENDICES

Appendix 1A. IRB Initial Approval Application (approved on Jan 22, 2013)

Cornell University
Office of
Research Integrity and Assurance

East Hill Office Building, Suite 320
395 Pine Tree Road
Ithaca, NY 14850
Phone: 607-255-5138
Fax: 607-255-0758

Request to Amend
A Currently-Approved Project

Cornell University
Institutional Review Board - Human Participants

Part 1 - Administrative Information

Protocol Information

Protocol #:	1301003550
Title:	A False Balance? Affect, exemplars, and media coverage of controversial risk
Protocol approval date:	December 19, 2012

Investigator Information

Principal Investigator (PI):	Graham Dixon
Net ID:	gnd5
Email address:	gnd5@cornell.edu
College/Division:	Graduate School
Department/Unit:	Communication

Status ☐ Undergraduate Student ☒ Graduate Student ☐ Post Doctoral Fellow ☐ Faculty ☐ Staff

Faculty member supervising the project: Katherine McComas

Net ID: kam19 Email address: kam19@cornell.edu

Cornell University IRB Amendment Form 1

Part 2 - Amendment Information

1. Please select ALL the categories of amendment(s) you are requesting.

- ☐ *Change in Study Title*
- ☐ *Change in Principal Investigator*
- ☐ *Addition of/change in research personnel*
- ☒ *Change to research/study design, methods or procedures (e.g., observations, interventions, collection of biological samples or biometric information, participant tasks, etc.)*
- ☒ *Addition of/change to study population*
- ☒ *Addition of/change to recruitment or compensation procedure(s)*
- ☒ *Addition of/change to survey(s), questionnaire(s), or other research instruments - please attach the revised instrument/s*
- ☒ *Addition of/change to the identifiers collected in the study, or any others that would impact the privacy and confidentiality of the study participants*
- ☒ *Addition of/change to informed consent/assent document(s) and/or procedures - please attach all related documents*
- ☐ *Other changes*

2. You selected the following categories of amendments. For each of the following, please describe the change you are proposing.

Change to research/study design, methods or procedures

What do the changes to the research/study design, methods or procedures involve? (Select all that apply)

- ☒ Active collection of data (not human biological materials or physiological data)
- ☐ Active collection and use of human biological materials or physiological data
- ☐ Use of physiological or biomedical devices, or drugs, biologics, or chemical agents
- ☐ Use of existing data (not human biological materials)
- ☐ Use of existing human biological materials

2.1. Please describe the changes to the research/study design, methods or procedures.

The research will involve randomly assigning participants (aged 18+) to read one of six news articles about health risk (three which are about the DTaP vaccine; three on raw milk). Specifically, participants will be assigned to read one of six articles of a risk with two competing interpretations of its safety. Two conditions (one for DTaP vaccine/one for raw milk) will have a negative exemplar consisting of an image and caption assigned to the safe side only. Two other conditions (one for DTaP vaccine/one for raw milk) will have negative exemplar consisting of the same image, but with different identifying caption, assigned to the unsafe side only. Two control conditions (one for DTaP vaccine/one for raw

milk) will not include the exemplar for either of the conflicting interpretations.
We use negative affect instead of positive affect because previous risk research has found people to be more attentive towards negative stimulus (Ochsner, 2000) and more likely to seek risk-related information after encountering it (Griffin et al., 2004; Yang & Kahlor, in press). Also, in two-sided risk news coverage, the affect-inducing stimulus is typically negative, considering "risk" refers to the likelihood of incurring harm or loss (Stern & Fineberg, 1996).

For the DTaP vaccine conditions, the manipulated image will depict a child in a hospital bed, captioned with a short narrative for why the vaccine is safe or unsafe, depending on its treatment condition (the image will remain the same across experimental conditions). For the Raw milk conditions, the manipulated image will involve the same message with a short caption explaining why raw milk is safe or unsafe, depending on its treatment condition. For the condition where the exemplar is placed only on the safe side, the caption will identify the child as having asthma, and that his parents and other proponents of raw milk believe his asthma can be cured by consuming raw milk. For the condition where the exemplar is placed only on the unsafe side, the caption will identify the child as a patient who contracted Campylobacter after consuming raw milk.

The six articles' content will be modeled from real news articles presenting two-sided risk messages. Excluding the affect-inducing exemplar, information will be presented as statistics designed to not elicit a strong affective response (either positive or negative). This is done because statistical representation of risk produces a more neutral affective response than population figures (Timmermans et al., 2008) or images (Slovic, 2007). Also, none of the articles will include a statement concerning where the strength of evidence lies, omitting this piece of contextual information.

Please see survey for examples of the six articles.

Addition of/change to study population

There will be two populations used for the study. A pilot study conducted this spring will involve undergraduate students at Cornell. They will be recruited via SUSAN. The second population will be via a panel purchased through Qualtrics. The Qualtrics sample will consist of ~1000 participants (18+ adults).

Addition of/change to recruitment or compensation procedure(s)

Recruitment for the Spring pilot study will be via SUSAN; the Qualtrics panel doesn't require recruitment.

Addition of/change to survey(s), questionnaire(s), or other research instruments

See attached survey materials.

Please include copies of the new and/or amended surveys, questionnaires, or other research instruments.

Addition of/change to the identifiers collected in the study, or any others that would impact the privacy and confidentiality of the study participants

Anonymity and confidentiality will be ensured with password protected data storage and with anonymized data (the researchers will not know the identities of their participants)

Addition of/change to informed consent/assent document(s) and/or procedures – please attach all related documents

Are you adding new child assent and/or parental permission documents and procedures? ☐ Yes ☐ No

3. **Please state the reasons you are making amendments to the study.**

This amendment is needed because our current approval is only for a "project development approval"

4. **Are any of these changes the result of something that occurred during human participant interaction or an unexpected event?** ☐ Yes ☒ No

5. **Will the proposed changes have an impact on the risks or benefits to research participants? Please explain.**

Any risks to participants should not exceed those encountered in day-to-day life. There are no tangible benefits to participants.

6. **Do these changes involve information that might relate to a subject's willingness to continue to take part in the research?** ☐ Yes ☒ No

Appendix 1B. IRB exemption approval form

Cornell University
Office of
Research Integrity and Assurance

East Hill Office Building, Suite 320
395 Pine Tree Road
Ithaca, NY 14850
p. 607-255-5138
f. 607-255-0758
www.irb.cornell.edu

Institutional Review Board for Human Participants

Concurrence of Exemption

To: Graham Dixon
From: Matthew Aldridge, Senior IRB Administrator
Date: January 22, 2013

RE: **Protocol ID#:** 1301003550
Project(s): A False Balance? Affect, Exemplars, and Media Coverage of Controversial Risk

I have reviewed the above-referenced project and found it to qualify for **Exemption from IRB Review** according to paragraph #2 of the Department of Health and Human Services Code of Federal Regulations 45 CFR 46.101(b).

This proposal has not been evaluated for scientific merit, except to weigh the risk to the human participants in relation to the potential benefits.

Please be aware of the following:

- It is your responsibility as a researcher to familiarize yourself with and conduct the research in accordance with the ethical standards of the Belmont Report (http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html) and be aware of the University's policy on exemption from IRB review (http://www.irb.cornell.edu/documents/IRB%20Policy%202.pdf)..
- You must notify the IRB office of changes or amendments to the above-referenced protocol **BEFORE** their implementation.
- You are not required to submit progress reports or requests for continuing review/approval to the IRB office, unless you modify your study protocol.

c: Katherine McComas

Appendix 2A. Chapter 3 stimulus materials (inaction risk articles)

Groups disagree over vaccine safety

Susan Garza comforts her daughter, 3, hospitalized with pertussis. Garza believes her daughter got pertussis because she did not get the DTaP vaccine.

Portland – As pertussis cases reach an all-time high in the U.S., health officials are urging parents to vaccinate their children with the Diphtheria, Tetanus, and Pertussis (DTaP) vaccine. But is the vaccine safe?

According to officials at the Centers for Disease Control and Prevention, the DTaP vaccine has been tested and proven to be a safe vaccine. CDC vaccine safety chief John Iskander explains that "the most common side effects are usually mild and occur in about 25% of patients, which include minor swelling. Serious reactions that require hospitalization occur in less than 1 in a million people and are extremely rare."

However, researchers at the health advocacy group, Vaccine Risk Management Institute (VRMI), disagree with Iskander's findings. Suzanne Meyer, president of VRMI, believes that the DTaP vaccine is unsafe. Combing the FDA's Vaccine Adverse Event Reporting System (VAERS), Meyer says she "discovered 71 reports of death from people who received DTaP since Sept, 2008. Additionally, 5% of reported reactions were listed as "severe," that included complications such as limb paralysis."

"This is an important wake-up call for parents," said Meyer, who urges parents to inform themselves on the potential risks of the DTaP vaccine.

While acknowledging the VAERS reports, Iskander explains that other factors not mentioned in the reports are more likely the cause of the reported side effects. Iskander adds, "by not receiving the vaccine you are putting yourself and others at risk of contracting pertussis, which has killed 13 children this year." However, Meyer counters, "63% of VAERS reports stated that reactions occurred the same day the vaccine was given; this shows the reactions were likely caused by the vaccine."

Despite their disagreement, Iskander and Meyer together urge parents to learn more about vaccination. They both provided links to their websites for interested parents: CDC (vaccines.gov) and Vaccine Risk Management Institute (VRMI.org).

Nutrition group promotes raw milk as CDC voices concern

Susan Garza, 3, hospitalized due to a severe asthma attack. Garza's mother believes raw milk can help cure her daughter's asthma.

Portland – Originally used to preserve wine 140 years ago, pasteurization has become the primary tool for treating milk in the US. However, popularity surrounding unpasteurized (also known as “raw”) milk has grown. But is it safe?

According to Barbara Mahon, deputy director of enteric diseases at CDC, raw milk is 150 times more likely to cause food-borne illness outbreaks than pasteurized milk, and such outbreaks have a hospitalization rate 13 times higher than those involving pasteurized dairy products. People who get sick from outbreaks tied to raw milk are also younger than those sickened in outbreaks linked to pasteurized milk. About 60% are younger than 20. "It's just tragic when a parent gives a child raw milk because they're trying to do something for them and they end up making them sick," says Mahon.

However, Rebecca Rand, president of the Institute for Nutritional Studies believes raw milk is safe. According to Rand, the absolute risk of developing a serious illness (i.e. one that would require hospitalization) from drinking raw milk is small: about 1 in 6 million.

Rand also states that raw milk includes over 100 vitamins and health-giving enzymes otherwise destroyed during the pasteurization process that can significantly reverse asthma and behavior problems in children.

A recently published study partially supports Rand’s claim. It found that, compared with kids who only drank pasteurized milk, those who drank raw milk had a 40% reduction in asthma severity -- even after accounting for other factors that might be relevant. “Without access to raw milk, many asthmatic children would be in greater pain and suffering,” says Rand.

While acknowledging the asthma study, Mahon believes it is unlikely for raw milk to cure so many illnesses and that it is riskier to consume raw milk, even for children with asthma. She adds, "From CDC's perspective, while it is possible to get foodborne illnesses from many different foods, raw milk is one of the riskiest of all, especially for young children." Rand counters, “it’s far riskier for asthmatic children not have raw milk because their state restricts its sales.”

Despite their disagreement, Mahon and Rand together urge parents to learn more about raw milk.

Appendix 2B. Chapter 3 stimulus materials (action risk articles)

Groups disagree over vaccine safety

Susan Garza comforts her daughter, 3, hospitalized with limb paralysis. Garza believes her daughter had a severe reaction to the DTaP vaccine.

Portland – As pertussis cases reach an all-time high in the U.S., health officials are urging parents to vaccinate their children with the Diphtheria, Tetanus, and Pertussis (DTaP) vaccine. But is the vaccine safe?

According to officials at the Centers for Disease Control and Prevention, the DTaP vaccine has been tested and proven to be a safe vaccine. CDC vaccine safety chief John Iskander explains that "the most common side effects are usually mild and occur in about 25% of patients, which include minor swelling. Serious reactions that require hospitalization occur in less than 1 in a million people and are extremely rare."

However, researchers at the health advocacy group, Vaccine Risk Management Institute (VRMI), disagree with Iskander's findings. Suzanne Meyer, president of VRMI, believes that the DTaP vaccine is unsafe. Combing the FDA's Vaccine Adverse Event Reporting System (VAERS), Meyer says she "discovered 71 reports of death from people who received DTaP since Sept, 2008. Additionally, 5% of reported reactions were listed as "severe," that included complications such as limb paralysis."

"This is an important wake-up call for parents," said Meyer, who urges parents to inform themselves on the potential risks of the DTaP vaccine.

While acknowledging the VAERS reports, Iskander explains that other factors not mentioned in the reports are more likely the cause of the reported side effects. Iskander adds, "by not receiving the vaccine you are putting yourself and others at risk of contracting pertussis, which has killed 13 children this year." However, Meyer counters, "63% of VAERS reports stated that reactions occurred the same day the vaccine was given; this shows the reactions were likely caused by the vaccine."

Despite their disagreement, Iskander and Meyer together urge parents to learn more about vaccination. They both provided links to their websites for interested parents: CDC (vaccines.gov) and Vaccine Risk Management Institute (VRMI.org).

Nutrition group promotes raw milk as CDC voices concern

Susan Garza, 3, hospitalized with E. Coli infection. Garza's mother believes the infection was caused by her daughter drinking contaminated raw milk.

Portland – Originally used to preserve wine 140 years ago, pasteurization has become the primary tool for treating milk in the US. However, popularity surrounding unpasteurized (also known as "raw") milk has grown. But is it safe?

According to Barbara Mahon, deputy director of enteric diseases at CDC, raw milk is 150 times more likely to cause food-borne illness outbreaks than pasteurized milk, and such outbreaks have a hospitalization rate 13 times higher than those involving pasteurized dairy products. People who get sick from outbreaks tied to raw milk are also younger than those sickened in outbreaks linked to pasteurized milk. About 60% are younger than 20. "It's just tragic when a parent gives a child raw milk because they're trying to do something for them and they end up making them sick," says Mahon.

However, Rebecca Rand, president of the Institute for Nutritional Studies believes raw milk is safe. According to Rand, the absolute risk of developing a serious illness (i.e. one that would require hospitalization) from drinking raw milk is small: about 1 in 6 million.

Rand also states that raw milk includes over 100 vitamins and health-giving enzymes otherwise destroyed during the pasteurization process that can significantly reverse asthma and behavior problems in children.

A recently published study partially supports Rand's claim. It found that, compared with kids who only drank pasteurized milk, those who drank raw milk had a 40% reduction in asthma severity -- even after accounting for other factors that might be relevant. "Without access to raw milk, many asthmatic children would be in greater pain and suffering," says Rand.

While acknowledging the asthma study, Mahon believes it is unlikely for raw milk to cure so many illnesses and that it is riskier to consume raw milk, even for children with asthma. She adds, "From CDC's perspective, while it is possible to get foodborne illnesses from many different foods, raw milk is one of the riskiest of all, especially for young children." Rand counters, "it's far riskier for asthmatic children not have raw milk because their state restricts its sales."

Despite their disagreement, Mahon and Rand together urge parents to learn more about raw milk.

Appendix 2C. Chapter 3 stimulus materials (control articles)

Groups disagree over vaccine safety

Portland – As pertussis cases reach an all-time high in the U.S., health officials are urging parents to vaccinate their children with the Diphtheria, Tetanus, and Pertussis (DTaP) vaccine. But is the vaccine safe?

According to officials at the Centers for Disease Control and Prevention, the DTaP vaccine has been tested and proven to be a safe vaccine. CDC vaccine safety chief John Iskander explains that "the most common side effects are usually mild and occur in about 25% of patients, which include minor swelling. Serious reactions that require hospitalization occur in less than 1 in a million people and are extremely rare."

However, researchers at the health advocacy group, Vaccine Risk Management Institute (VRMI), disagree with Iskander's findings. Suzanne Meyer, president of VRMI, believes that the DTaP vaccine is unsafe. Combing the FDA's Vaccine Adverse Event Reporting System (VAERS), Meyer says she "discovered 71 reports of death from people who received DTaP since Sept, 2008. Additionally, 5% of reported reactions were listed as "severe," that included complications such as limb paralysis."

"This is an important wake-up call for parents," said Meyer, who urges parents to inform themselves on the potential risks of the DTaP vaccine.

While acknowledging the VAERS reports, Iskander explains that other factors not mentioned in the reports are more likely the cause of the reported side effects. Iskander adds, "by not receiving the vaccine you are putting yourself and others at risk of contracting pertussis, which has killed 13 children this year." However, Meyer counters, "63% of VAERS reports stated that reactions occurred the same day the vaccine was given; this shows the reactions were likely caused by the vaccine."

Despite their disagreement, Iskander and Meyer together urge parents to learn more about vaccination. They both provided links to their websites for interested parents: CDC (vaccines.gov) and Vaccine Risk Management Institute (VRMI.org).

Nutrition group promotes raw milk as CDC voices concern

Portland – Originally used to preserve wine 140 years ago, pasteurization has become the primary tool for treating milk in the US. However, popularity surrounding unpasteurized (also known as “raw”) milk has grown. But is it safe?

According to Barbara Mahon, deputy director of enteric diseases at CDC, raw milk is 150 times more likely to cause food-borne illness outbreaks than pasteurized milk, and such outbreaks have a hospitalization rate 13 times higher than those involving pasteurized dairy products. People who get sick from outbreaks tied to raw milk are also younger than those sickened in outbreaks linked to pasteurized milk. About 60% are younger than 20. "It's just tragic when a parent gives a child raw milk because they're trying to do something for them and they end up making them sick," says Mahon.

However, Rebecca Rand, president of the Institute for Nutritional Studies believes raw milk is safe. According to Rand, the absolute risk of developing a serious illness (i.e. one that would require hospitalization) from drinking raw milk is small: about 1 in 6 million.

Rand also states that raw milk includes over 100 vitamins and health-giving enzymes otherwise destroyed during the pasteurization process that can significantly reverse asthma and behavior problems in children.

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While acknowledging the asthma study, Mahon believes it is unlikely for raw milk to cure so many illnesses and that it is riskier to consume raw milk, even for children with asthma. She adds, "From CDC's perspective, while it is possible to get foodborne illnesses from many different foods, raw milk is one of the riskiest of all, especially for young children." Rand counters, “it’s far riskier for asthmatic children not have raw milk because their state restricts its sales.”

Despite their disagreement, Mahon and Rand together urge parents to learn more about raw milk.

Appendix 3.A Chapter 3 survey (For raw milk articles)

What is your age?

Sex
- ❍ Male (1)
- ❍ Female (2)

Please indicate your race. Check all categories that apply.
- ❍ American Indian/Alaska Native (1)
- ❍ Black/African American (2)
- ❍ White (3)
- ❍ Asian (4)
- ❍ Native Hawaiian/Other Pacific Islander (5)
- ❍ Other race (please specify) (6) _____

Do you consider yourself Hispanic or Latino?
- ❍ Yes (1)
- ❍ No (2)

Using the scale provided to the right of each statement, please check the appropriate box that best reflects your answer.

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
Scientists know best what is good for the public. (1)	❍	❍	❍	❍	❍	❍
It is important for scientists to get research done even if they displease people by doing it. (2)	❍	❍	❍	❍	❍	❍
Tobacco use is not a healthy behavior (3)	❍	❍	❍	❍	❍	❍
Scientists should make the decisions about how to conduct scientific research. (4)	❍	❍	❍	❍	❍	❍
Nanotechnology benefits the public. (5)	❍	❍	❍	❍	❍	❍
Raw milk is safe to consume. (6)	❍	❍	❍	❍	❍	❍
Violent television is linked to violent behavior. (7)	❍	❍	❍	❍	❍	❍
I discuss events from television news with my friends. (8)	❍	❍	❍	❍	❍	❍
My ideal vacation is on the beach. (9)	❍	❍	❍	❍	❍	❍

Using the scale provided to the right of each statement, please check the appropriate box that best reflects your answer

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
I enjoy a task that involves coming up with new solutions to problems. (1)	❍	❍	❍	❍	❍	❍
I prefer a task that is intellectual and difficult to one that does not require much thought. (2)	❍	❍	❍	❍	❍	❍
I prefer complex to simple problems. (3)	❍	❍	❍	❍	❍	❍
I enjoy thinking abstractly. (4)	❍	❍	❍	❍	❍	❍
I only think as hard as I have to. (5)	❍	❍	❍	❍	❍	❍
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (6)	❍	❍	❍	❍	❍	❍
I find satisfaction in thinking hard for a long time. (7)	❍	❍	❍	❍	❍	❍
Thinking is	❍	❍	❍	❍	❍	❍

not my idea of fun. (8)						
I try to avoid situations where there is a good chance that I will have to think hard about something (9)	❍	❍	❍	❍	❍	❍
I enjoy solving puzzles. (10)	❍	❍	❍	❍	❍	❍

The next page will have a news article which you are asked to read. The article was taken from a prominent news outlet and re-posted on this survey. Please read the article as you would normally read an online news article. When you have finished reading the news article, click on the lower right-hand button to continue with the survey. Please do not access any other websites or click any other links while reading the article. Thank you!

How much of the emotions listed below did you feel from reading the news article?

	0=not at all (1)	1 (2)	2 (3)	3 (4)	4 (5)	5=maximum intensity (6)
guilt (1)	❍	❍	❍	❍	❍	❍
irritation (2)	❍	❍	❍	❍	❍	❍
sadness (3)	❍	❍	❍	❍	❍	❍
worry (4)	❍	❍	❍	❍	❍	❍
anger (5)	❍	❍	❍	❍	❍	❍

Think back to the claims made by the two spokespersons profiled in the article. List up to six claims either of the spokespersons made about raw milk.

1 (1)
2 (2)
3 (3)
4 (4)
5 (5)
6 (6)

To what extent do you agree or disagree with the following items?

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
Illness caused by raw milk is a serious problem in the U.S. (1)	❍	❍	❍	❍	❍	❍
The likelihood of experiencing severe side effects after consuming raw milk is high. (2)	❍	❍	❍	❍	❍	❍
Outbreaks linked to raw milk are a serious threat to public health. (3)	❍	❍	❍	❍	❍	❍
The likelihood of acquiring unknown long-term side effects from consuming raw milk is low. (4)	❍	❍	❍	❍	❍	❍
Illnesses linked to raw milk are a larger health risk than most people realize. (5)	❍	❍	❍	❍	❍	❍
The likelihood that raw milk negatively affects a person's body is high. (6)	❍	❍	❍	❍	❍	❍
Not consuming raw milk increases the risk of asthma attacks for asthmatic children. (8)	❍	❍	❍	❍	❍	❍

There is a higher likelihood that asthmatic children will experience an asthma attack if they do not consume raw milk. (9)	❍	❍	❍	❍	❍	❍
For asthma sufferers, the likelihood of experiencing an asthma attack is higher without raw milk. (10)	❍	❍	❍	❍	❍	❍
Increased asthma risk due to prohibition of raw milk is a serious problem in the U.S. (11)	❍	❍	❍	❍	❍	❍
The prohibition of raw milk consumption is a serious threat to asthma control. (12)	❍	❍	❍	❍	❍	❍
There are larger health consequences for not drinking raw milk than most people realize. (13)	❍	❍	❍	❍	❍	❍

To what extent do you agree with the following items?

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
I plan to seek information about raw milk in the near future. (1)	❍	❍	❍	❍	❍	❍
I will try to seek information about raw milk in the near future. (2)	❍	❍	❍	❍	❍	❍
I intend to find more information about raw milk soon. (3)	❍	❍	❍	❍	❍	❍
I intend to look for information about raw milk in the near future. (4)	❍	❍	❍	❍	❍	❍
I will look for information related to raw milk in the near future. (5)	❍	❍	❍	❍	❍	❍

Did your news article have a picture?

- ❍ Yes (1)
- ❍ No (2)

Please answer the following question if your news article contained a picture. What did the photo depict?

- ❍ A child with E. Coli infection caused by contaminated raw milk. (1)
- ❍ A child with severe asthma whose mother believes raw milk will provide a cure. (2)

Thank you for taking the time to complete this survey. This survey investigates how people process conflicting information about health controversies. The news article you read is a real article, however, the spokespersons and their organizations' names were changed to comply with confidentiality. Thank you for you participation. You will receive compensation soon.***PLEASE CLICK ON THE BUTTON ON THE LOWER RIGHT HAND CORNER***

Appendix 3B. Chapter 3 survey (for vaccine articles)

What is your age?

Sex
- ❍ Male (1)
- ❍ Female (2)

Please indicate your race. Check all categories that apply.
- ❍ American Indian/Alaska Native (1)
- ❍ Black/African American (2)
- ❍ White (3)
- ❍ Asian (4)
- ❍ Native Hawaiian/Other Pacific Islander (5)
- ❍ Other race (please specify) (6) _____

Do you consider yourself Hispanic or Latino?
- ❍ Yes (1)
- ❍ No (2)

Using the scale provided to the right of each statement, please check the appropriate box that best reflects your answer.

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
Scientists know best what is good for the public. (1)	❍	❍	❍	❍	❍	❍
It is important for scientists to get research done even if they displease people by doing it. (2)	❍	❍	❍	❍	❍	❍
Tobacco use is not a healthy behavior (3)	❍	❍	❍	❍	❍	❍
Scientists should make the decisions about how to conduct scientific research. (4)	❍	❍	❍	❍	❍	❍
Nanotechnology benefits the public. (5)	❍	❍	❍	❍	❍	❍
Violent television is linked to violent behavior. (7)	❍	❍	❍	❍	❍	❍
I discuss events from television news with my friends. (8)	❍	❍	❍	❍	❍	❍
My ideal vacation is on the beach. (9)	❍	❍	❍	❍	❍	❍

Using the scale provided to the right of each statement, please check the appropriate box that best reflects your answer

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
I enjoy a task that involves coming up with new solutions to problems. (1)	❍	❍	❍	❍	❍	❍
I prefer a task that is intellectual and difficult to one that does not require much thought. (2)	❍	❍	❍	❍	❍	❍
I prefer complex to simple problems. (3)	❍	❍	❍	❍	❍	❍
I enjoy thinking abstractly. (4)	❍	❍	❍	❍	❍	❍
I only think as hard as I have to. (5)	❍	❍	❍	❍	❍	❍
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (6)	❍	❍	❍	❍	❍	❍
I find satisfaction in thinking hard for a long time. (7)	❍	❍	❍	❍	❍	❍
Thinking is	❍	❍	❍	❍	❍	❍

not my idea of fun. (8)						
I try to avoid situations where there is a good chance that I will have to think hard about something (9)	❍	❍	❍	❍	❍	❍
I enjoy solving puzzles. (10)	❍	❍	❍	❍	❍	❍

The next page will have a news article which you are asked to read. The article was taken from a prominent news outlet and re-posted on this survey. Please read the article as you would normally read an online news article. When you have finished reading the news article, click on the lower right-hand button to continue with the survey. Please do not access any other websites or click any other links while reading the article. Thank you!

How much of the emotions listed below did you feel from reading the news article?

	0=not at all (1)	1 (2)	2 (3)	3 (4)	4 (5)	5=maximum intensity (6)
guilt (1)	❍	❍	❍	❍	❍	❍
irritation (2)	❍	❍	❍	❍	❍	❍
sadness (3)	❍	❍	❍	❍	❍	❍
worry (4)	❍	❍	❍	❍	❍	❍
anger (5)	❍	❍	❍	❍	❍	❍

Think back to the claims made by the two spokespersons profiled in the article. List up to six claims made about the DTaP vaccine in the article.

1 (1)
2 (2)
3 (3)
4 (4)
5 (5)
6 (6)

To what extent do you agree or disagree with the following items?

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
DTaP vaccine side effects are a serious threat to public health. (1)	❍	❍	❍	❍	❍	❍
DTaP vaccine side effects are a larger health risk than most people realize. (3)	❍	❍	❍	❍	❍	❍
The likelihood of experiencing severe side effects following DTaP vaccine is high. (4)	❍	❍	❍	❍	❍	❍
DTaP vaccine side effects are a serious problem in the U.S. (6)	❍	❍	❍	❍	❍	❍
The likelihood of acquiring long-term side effects from DTaP vaccine is low. (7)	❍	❍	❍	❍	❍	❍
The likelihood that the DTaP vaccine negatively affects a person's health is high. (9)	❍	❍	❍	❍	❍	❍
Not receiving the DTaP vaccine is a serious threat to public health. (10)	❍	❍	❍	❍	❍	❍
The consequences	❍	❍	❍	❍	❍	❍

of not receiving the DTaP vaccine is a larger health risk than most people realize. (11)						
Disease outbreaks due to non-vaccination are a serious problem in the U.S. (12)	❍	❍	❍	❍	❍	❍
The likelihood of acquiring whooping cough is higher if one does not receive the DTaP vaccine. (13)	❍	❍	❍	❍	❍	❍
The likelihood of experiencing illness is higher if one does not receive the DTaP vaccine. (14)	❍	❍	❍	❍	❍	❍
Acquiring long-term illness is more likely for those who do not receive the DTaP vaccine. (15)	❍	❍	❍	❍	❍	❍

To what extent do you agree with the following items?

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
I plan to seek information about vaccines in the near future. (1)	❍	❍	❍	❍	❍	❍
I will try to seek information about vaccines in the near future. (2)	❍	❍	❍	❍	❍	❍
I intend to find more information about vaccines soon. (3)	❍	❍	❍	❍	❍	❍
I intend to look for information about vaccines in the near future. (4)	❍	❍	❍	❍	❍	❍
I will look for information related to vaccines in the near future. (5)	❍	❍	❍	❍	❍	❍

Please answer the following question if your news article contained a picture. What did the photo depict?

- ❍ A child purportedly paralyzed due to a severe reaction to DTaP vaccine. (1)
- ❍ An unvaccinated child who had pertussis. (2)
- ❍ my article did not contain a photo (3)

Thank you for taking the time to complete this survey. This survey investigates how people process conflicting information about health controversies. The news article you read is a real article, however, the spokespersons and their organizations' names were changed to comply with confidentiality. It is important to stress that most doctors and scientists reject the belief that DTaP vaccine poses a significant health risk to children and adults.Thank you for you participation. You will receive compensation soon.***PLEASE CLICK ON THE BUTTON ON THE LOWER RIGHT HAND CORNER***

Appendix 4A. Chapter 4 webpage example

DEC
15

Groups Disagree Over Vaccine Safety

Portland – As pertussis cases reach an all-time high in the U.S., health officials are urging parents to vaccinate their children with the Diphtheria, Tetanus, and Pertussis (DTaP) vaccine. But is the vaccine safe?

According to officials at the Centers for Disease Control and Prevention, the DTaP vaccine has been tested and proven to be a safe vaccine. CDC vaccine safety chief John Iskander explains that the "the most common side effects are usually mild and occur in about 25% of patients, which include minor swelling and redness. Serious reactions that require hospitalization occur in less than 1 in a million people and are extremely rare."

However, researchers at the health advocacy group, Vaccine Risk Management Institute (VRMI), disagree with Iskander's findings. Suzanne Meyer, president of VRMI, believes that the DTaP vaccine is unsafe. Combing the FDA's Vaccine Adverse Event Reporting System (VAERS), Meyer says she "discovered 71 reports of death from people who received DTaP since Sept, 2008. Additionally, 5% of reported reactions were listed as "severe," that included complications such as limb paralysis."

"This is an important wake-up call for parents," said Meyer, who urges parents to inform themselves on the potential risks of the DTaP vaccine.

While acknowledging the VAERS reports, Iskander explains that other factors not mentioned in the reports are more likely the cause of the reported side effects. Iskander adds, "by not receiving the vaccine you are putting yourself and others at risk of contracting pertussis, which has killed 13 children this year."

However, Meyer counters, "63% of VAERS reports stated that reactions occurred the same day the vaccine was given, this shows the symptoms were likely caused by the vaccine."

Despite their disagreement, Iskander and Meyer together urge parents to learn more about vaccination. They both provided links to their websites for interested parents: CDC (vaccines.gov) and Vaccine Risk Management Institute (VRMI.org).

Posted 15th December 2013 by Gramo

g+1 0 Tweet 0 Like 0

5 View comments

Appendix 4B. Comments example

Posted 15th December 2013 by Gramo

g+1 0 Tweet 0 Like 0

5 View comments

Anonymous December 15, 2013 at 3:56 PM

Dtap vaccines are safe. Don't buy into the lunacy of the anti-vaccine "scholars" from the VRMI.

Reply

Anonymous December 15, 2013 at 3:57 PM

If one looks at the data, it clearly shows that the DTAP is safe for children. Let's not forget that just because someone reports a reaction does not mean that the reaction was caused by the vaccine.

Reply

Anonymous December 15, 2013 at 3:57 PM

Pertussis is not something to laugh about, it is a scary thing. Also, so few people got reactions from the shot that might have been a coincidence anyway.

Reply

Anonymous December 15, 2013 at 3:57 PM

I have had all 3 of my children vaccinated and haven't seen any side effects (except for crying – my 2 year old especially hates shots). I work with many parents and haven't heard of any whose children were injured by the DTaP. The VRMI cites numbers that seem too low and coincidental. I'm sticking with vaccines…

Reply

Anonymous December 15, 2013 at 3:57 PM

Shots can hurt, but never had a reaction like the one described by Meyer. I'm skeptical that a small vaccine can cause these problems.

Reply

Enter your comment…

Appendix 5A. Chapter 4 survey (for raw milk articles)

What is your age?

Sex
- ❍ Male (1)
- ❍ Female (2)
- ❍ Choose to not answer (3)

Please indicate your race. Check all categories that apply.
- ❍ American Indian/Alaska Native (1)
- ❍ Black/African American (2)
- ❍ White (3)
- ❍ Asian (4)
- ❍ Native Hawaiian/Other Pacific Islander (5)
- ❍ Other race (please specify) (6) _____

Do you consider yourself Hispanic or Latino?
- ❍ Yes (1)
- ❍ No (2)

Using the scale provided to the right of each statement, please check the appropriate box that best reflects your answer

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
I enjoy a task that involves coming up with new solutions to problems. (1)	❍	❍	❍	❍	❍	❍
I prefer a task that is intellectual and difficult to one that does not require much thought. (2)	❍	❍	❍	❍	❍	❍
I prefer complex to simple problems. (3)	❍	❍	❍	❍	❍	❍
I enjoy thinking abstractly. (4)	❍	❍	❍	❍	❍	❍
I only think as hard as I have to. (5)	❍	❍	❍	❍	❍	❍
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (6)	❍	❍	❍	❍	❍	❍
I find satisfaction in thinking hard for a long time. (7)	❍	❍	❍	❍	❍	❍
Thinking is	❍	❍	❍	❍	❍	❍

not my idea of fun. (8)						
I try to avoid situations where there is a good chance that I will have to think hard about something (9)	❍	❍	❍	❍	❍	❍
I enjoy solving puzzles. (10)	❍	❍	❍	❍	❍	❍

.

	none (1)	a little (2)	Some (3)	A Lot (4)
In general, how much attention do you pay to information about health or medical topics in the news? (1)	❍	❍	❍	❍

Using the scale provided to the right of each statement, please check the appropriate box that best reflects your answer.

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
Consuming the news makes me realize that my life is not so bad after all. (1)	❍	❍	❍	❍	❍	❍
I follow the news so I won't be surprised by higher prices and things like that. (2)	❍	❍	❍	❍	❍	❍
Following the news helps me forget about my own problems. (3)	❍	❍	❍	❍	❍	❍
Being a news consumer lets me see how big issues are finally worked out. (4)	❍	❍	❍	❍	❍	❍
I follow the news because I like to get the news first so I can pass it on to	❍	❍	❍	❍	❍	❍

other people. (5) Somehow I feel more secure and reassured after exposing myself to news media. (6)	❍	❍	❍	❍	❍	❍

The next page will contain a link to an online news article. Please click on the link to access the article and read and browse it in the way you would normally read and browse an online news article. *Please do not access other webpages*When finished reading the article, exit the tab and continue with the survey.

http://gndcornella.blogspot.com/

http://gndcornellb.blogspot.com/

http://gndcornellc.blogspot.com/

How much of the emotions listed below did you feel from reading the news article?

	0=not at all (1)	1 (2)	2 (3)	3 (4)	4 (5)	5=maximum intensity (6)
guilt (1)	❍	❍	❍	❍	❍	❍
irritation (2)	❍	❍	❍	❍	❍	❍
sadness (3)	❍	❍	❍	❍	❍	❍
worry (4)	❍	❍	❍	❍	❍	❍
anger (5)	❍	❍	❍	❍	❍	❍

To what extent do you agree with the following items?

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
I plan to seek information about raw milk in the near future. (1)	❍	❍	❍	❍	❍	❍
I will try to seek information about raw milk in the near future. (2)	❍	❍	❍	❍	❍	❍
I intend to find more information about raw milk soon. (3)	❍	❍	❍	❍	❍	❍

Estimate your knowledge of raw milk with 0= knowing nothing and 100= knowing everything you could possibly know about the topic.
_____ . (1)

This time, using the same scale, estimate how much knowledge you think you NEED on this same topic (0-100).
_____ . (1)

Did you read any user comments below the news article?
❍ yes (1)
❍ No (2)

Please indicate how many user comments you read accompanying the news story.
❍ 1 (1)
❍ 2 (2)
❍ 3 (3)
❍ 4 (4)
❍ 5 (5)

Please answer the following question if you read any of the user comments.

	Anti raw milk -7 (1)	-6 (2)	-5 (3)	-4 (4)	-3 (5)	-2 (6)	-1 (7)	Neutral 0 (8)	1 (9)	2 (10)	3 (11)	4 (12)	5 (13)	6 (14)	Pro raw milk 7 (15)
In terms of the raw milk safety, the news article user comments were primarily: (1)	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

.

	Strongly disagree (1)	Disagree (2)	Tend to disagree (3)	Tend to agree (4)	Agree (5)	Strongly agree (16)
Prior to this study, I believed raw milk to be safe. (1)	❍	❍	❍	❍	❍	❍

Please answer the following question if your news article contained a picture. What did the photo depict?

❍ A child sick from e. coli. (1)
❍ A child with severe asthma (2)
❍ my article did not contain a photo (3)

Thank you for taking the time to complete this survey. This survey is for a study that investigates how people process conflicting information about health controversies. Thank you for you participation.***PLEASE CLICK ON THE BUTTON ON THE LOWER RIGHT HAND CORNER***

Appendix 5B. Chapter 4 survey (for vaccine articles)

What is your age?

Sex

- ❍ Male (1)
- ❍ Female (2)
- ❍ Choose to not answer (3)

Please indicate your race. Check all categories that apply.

- ❍ American Indian/Alaska Native (1)
- ❍ Black/African American (2)
- ❍ White (3)
- ❍ Asian (4)
- ❍ Native Hawaiian/Other Pacific Islander (5)
- ❍ Other race (please specify) (6) _____

Do you consider yourself Hispanic or Latino?

- ❍ Yes (1)
- ❍ No (2)

Using the scale provided to the right of each statement, please check the appropriate box that best reflects your answer

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
I enjoy a task that involves coming up with new solutions to problems. (1)	❍	❍	❍	❍	❍	❍
I prefer a task that is intellectual and difficult to one that does not require much thought. (2)	❍	❍	❍	❍	❍	❍
I prefer complex to simple problems. (3)	❍	❍	❍	❍	❍	❍
I enjoy thinking abstractly. (4)	❍	❍	❍	❍	❍	❍
I only think as hard as I have to. (5)	❍	❍	❍	❍	❍	❍
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (6)	❍	❍	❍	❍	❍	❍
I find satisfaction in thinking hard for a long time. (7)	❍	❍	❍	❍	❍	❍
Thinking is	❍	❍	❍	❍	❍	❍

not my idea of fun. (8)						
I try to avoid situations where there is a good chance that I will have to think hard about something (9)	❍	❍	❍	❍	❍	❍
I enjoy solving puzzles. (10)	❍	❍	❍	❍	❍	❍

	none (1)	a little (2)	Some (3)	A Lot (4)
In general, how much attention do you pay to information about health or medical topics in the news? (1)	❍	❍	❍	❍

Using the scale provided to the right of each statement, please check the appropriate box that best reflects your answer.

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
Consuming the news makes me realize that my life is not so bad after all. (1)	❍	❍	❍	❍	❍	❍
I follow the news so I won't be surprised by higher prices and things like that. (2)	❍	❍	❍	❍	❍	❍
Following the news helps me forget about my own problems. (3)	❍	❍	❍	❍	❍	❍
Being a news consumer lets me see how big issues are finally worked out. (4)	❍	❍	❍	❍	❍	❍
I follow the news because I like to get the news first so I can pass it on to other people. (5)	❍	❍	❍	❍	❍	❍
Somehow I feel more secure and reassured after exposing myself to news	❍	❍	❍	❍	❍	❍

media. (6)						

The next page will contain a link to an online news article. Please click on the link to access the article and read and browse it in the way you would normally read and browse an online news article. *Please do not access other webpages*When finished reading the article, exit the tab and continue with the survey.

http://gndcornell1.blogspot.com/

http://gnd5cornell2.blogspot.com/

http://gndcornell3.blogspot.com/

How much of the emotions listed below did you feel from reading the news article?

	0=not at all (1)	1 (2)	2 (3)	3 (4)	4 (5)	5=maximum intensity (6)
guilt (1)	❍	❍	❍	❍	❍	❍
irritation (2)	❍	❍	❍	❍	❍	❍
sadness (3)	❍	❍	❍	❍	❍	❍
worry (4)	❍	❍	❍	❍	❍	❍
anger (5)	❍	❍	❍	❍	❍	❍

To what extent do you agree with the following items?

	Strongly Disagree (1)	Disagree (2)	Tend to Disagree (3)	Tend to Agree (4)	Agree (5)	Strongly Agree (6)
I plan to seek information about vaccines in the near future. (1)	❍	❍	❍	❍	❍	❍
I will try to seek information about vaccines in the near future. (2)	❍	❍	❍	❍	❍	❍
I intend to find more information about vaccines soon. (3)	❍	❍	❍	❍	❍	❍

Estimate your knowledge of vaccines with 0= knowing nothing and 100 = knowing everything you could possibly know about the topic.
_____ . (1)

This time, using the same scale, estimate how much knowledge you think you NEED on this same topic (0-100).
_____ . (1)

Did you read any user comments below the news article?
❍ yes (1)
❍ No (2)

Please indicate how many user comments you read accompanying the news story.
❍ 1 (1)
❍ 2 (2)
❍ 3 (3)
❍ 4 (4)
❍ 5 (5)

Please answer the following question if you read any of the user comments.

	Anti DTaP Vaccine -7 (1)	-6 (2)	-5 (3)	-4 (4)	-3 (5)	-2 (6)	-1 (7)	Neutral 0 (8)	1 (9)	2 (10)	3 (11)	4 (12)	5 (13)	6 (14)	Pro DTaP Vaccine 7 (15)
In terms of the DTaP vaccine, the news article user comments were primarily: (1)	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

	Strongly disagree (1)	Disagree (2)	Tend to disagree (3)	Tend to agree (4)	Agree (5)	Strongly Agree (6)
Prior to this study, I believed vaccines to be safe: (1)	❍	❍	❍	❍	❍	❍

Please answer the following question if your news article contained a picture.What did the photo depict?

❍ A child purportedly paralyzed due to a severe reaction to DTaP vaccine. (1)
❍ An unvaccinated child who had pertussis. (2)
❍ my article did not contain a photo (3)

Thank you for taking the time to complete this survey. This survey is for a study that investigates how people process conflicting information about health controversies. It is important to stress that most doctors and scientists reject the belief that the DTaP vaccine poses a significant health risk to children and adults. More information can be obtained at http://www.vaccines.gov/Thank you for you participation.***PLEASE CLICK ON THE BUTTON ON THE LOWER RIGHT HAND CORNER***

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