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Mammography Exemplars in online News Commentary: Prevalence of Exemplars, Effects on Risk Perceptions and Mammography Intentions, and Mechanisms of Action

Abstract

Multiple prior studies have examined the nature of news coverage of mammography but have neglected comments generated by readers. However, comments on online news stories have been shown to affect readers' beliefs and behaviors. Understanding the potential effects of user-generated comments and comments with exemplars, in particular, is necessary to fully understand the effects of online mammography news on media consumers.

Study 1 describes the prevalence, content, and representativeness of mammography exemplars in comments on online news about mammography using a content analysis of mammography news articles ($n = 71$) and comments ($n = 5,858$) appearing on The New York Times website from November 2009 to December 2014. Study 2 tests the effects of comments on risk perceptions and mammography intentions and mechanisms of these effects using a randomized online experiment with a sample of U.S. women between the ages of 38 and 48.

Of comments on news articles about mammography, 31% included a mammography exemplar. Of those, 41% included a mammogram-detected breast cancer exemplar and 19% included a false-positive mammogram exemplar. Additionally, articles with mammography exemplars were more likely to have comments that included mammography exemplars.

In Study 2, when compared to comments without exemplars, comments with exemplars did not produce effects on mammography intentions or risk perceptions. Compared to comments about false positives, comments about mammogram-detected breast cancer led to higher intentions to have a mammogram in the next two years, lower intentions to wait until age 50 to have a mammogram, and higher breast cancer risk perceptions. Effects were moderated by participant education level, family history of breast cancer, history of prior mammography, and time spent reading the experimental manipulation. Some effects on mammography intentions were mediated by changes in attitude toward waiting until age 50 to have a mammogram.

This study adds to evidence suggesting that comments appearing with news articles have effects on readers. Those who share content online and allow user-generated comments should consider potential effects before allowing comments to be posted.

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MAMMOGRAPHY EXEMPLARS IN ONLINE NEWS COMMENTARY:
PREVALENCE OF EXEMPLARS, EFFECTS ON RISK PERCEPTIONS AND
MAMMOGRAPHY INTENTIONS, AND MECHANISMS OF ACTION

Holli Hitt Seitz

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ABSTRACT

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Holli Hitt Seitz

Joseph N. Cappella

Multiple prior studies have examined the nature of news coverage of mammography but have neglected comments generated by readers. However, comments on online news stories have been shown to affect readers' beliefs and behaviors. Understanding the potential effects of user-generated comments and comments with exemplars, in particular, is necessary to fully understand the effects of online mammography news on media consumers.

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Of comments on news articles about mammography, 31% included a mammography exemplar. Of those, 41% included a mammogram-detected breast cancer

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In Study 2, when compared to comments without exemplars, comments with exemplars did not produce effects on mammography intentions or risk perceptions. Compared to comments about false positives, comments about mammogram-detected breast cancer led to higher intentions to have a mammogram in the next two years, lower intentions to wait until age 50 to have a mammogram, and higher breast cancer risk perceptions. Effects were moderated by participant education level, family history of breast cancer, history of prior mammography, and time spent reading the experimental manipulation. Some effects on mammography intentions were mediated by changes in attitude toward waiting until age 50 to have a mammogram.

This study adds to evidence suggesting that comments appearing with news articles have effects on readers. Those who share content online and allow user-generated comments should consider potential effects before allowing comments to be posted.

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CHAPTER 1

INTRODUCTION

“My mother skipped mammograms in her 40's and she died. I did them and I lived.”

– L. H.

“I had a mammogram that came back with ‘suspicious calcifications’ in one spot. I went back in for more views, and an ultrasound. I had needle biopsies. Still nothing conclusive. I remember a doctor suggesting that I have the area surgically removed. I took the ‘watch and wait’ option instead. I've been waiting now for 12 years and nothing has changed - in fact the ‘suspicious calcifications’ area seems to have disappeared. I'm told that I should feel lucky and grateful that I didn't have breast cancer after all that. Strangely I don't feel lucky.”

– A. M.

The topic of mammography has been frequently covered by the news media, particularly in recent years. A change in mammography recommendations in 2009 by the U.S. Preventive Services Task Force (USPSTF) triggered a wave of mammography media coverage (Squiers et al., 2011), and new screening technology, studies on the risks and benefits of mammography, revised breast cancer screening guidelines issued by the American Cancer Society, and celebrity breast cancer diagnoses have kept

mammography in the news. While news stories undoubtedly have an effect on the beliefs and behaviors of news consumers, these news stories do not operate alone. Often, online news stories are accompanied by reader comments (Weber, 2014), which means that readers' beliefs and behaviors are being influenced not only by the original news article but also by any commentary that they consume along with the article. When commenting on articles, readers regularly illustrate their points with personal stories and individual cases, or exemplars. As seen in the examples above, these mammography exemplars can be vivid, emotional, and persuasive. In fact, prior research shows that exemplars can have greater effects on risk perceptions than statistical information (Zillmann, 2006) and narrative evidence can have a greater effect on behavioral intentions than statistical evidence (Zebregs, van den Putte, Neijens, & de Graaf, 2015). Thus, exemplars in comments could potentially have more powerful effects on intentions and risk perceptions than the information in the articles with which they appear. Unfortunately, the frequency with which exemplars appear in comments is not well-known. In fact, prior content analyses of mammography coverage have not included an examination of user-generated commentary. This general lack of understanding of the composition of comments on news stories about mammography leads to the following research objective:

Objective 1: Describe the prevalence, content, and representativeness of mammography exemplars in comments on online news about mammography.

Objective 1 is addressed in Study 1, a content analysis of online newspaper articles about mammography and the user-generated comments appearing with these articles.

There has also been little research to date on the effects of online news comments on readers and even less research on the effects of comments that include exemplars. Prior research has shown that exemplars in news stories can have effects on behavioral intentions (Kim, Bigman, Leader, Lerman, & Cappella, 2012) and risk perceptions (Zillmann, 2006), and there is reason to believe that exemplars in comments on news articles can have similar effects. In general, exemplars and other forms of narrative evidence are known to be persuasive, particularly in the cancer context. Green (2006) argues that narratives can change beliefs and behaviors by reducing counter-arguing, modeling behavior change, providing cognitive rehearsal of behaviors, and creating strong attitudes. Given the dearth of prior research in this area, this dissertation addresses the following research objectives related to the effects of comments:

Objective 2: Test the effects of comments with exemplars on risk perceptions and mammography intentions.

Objective 3: Explore the mechanisms of action underlying effects of exemplar comments on risk perceptions and mammography intentions.

These research objectives are addressed through an experimental study of the effects of comments on readers. Study 2 addresses Objective 2 by testing the effects of comments with exemplars on risk perceptions and mammography intentions, including how effects differ for different types of mammography exemplars that appear in comments (e.g., false-positive mammography results, mammogram-detected cancer, etc.). Study 2 also addresses Objective 3 by testing predicted mediation paths to explain

the effects of comments with exemplars and testing potential moderators of predicted effects.

With the growing prevalence and importance of user-generated comments in online news, and media in general, understanding the effects of these comments on readers is crucial for those who wish to understand media effects. The results of this research may have important implications for news organizations or others who allow online comments, including organizations and federal agencies with public health functions.

Dissertation Overview

This dissertation addresses the research objectives above through an evaluation of the media environment surrounding mammography in recent years and an online experiment to test the effects of different types of user-generated comments on readers. The content analysis includes newspaper articles about mammography appearing between November 2009 and December 2014 and associated reader commentary, with a particular emphasis on the presence and representativeness of mammography exemplars in user-generated comments. The experiment examines the effects of these comments, specifically comments with false-positive exemplars and mammogram-detected cancer exemplars, on readers.

The experimental design necessitated that a content analysis first be undertaken to gauge the prevalence and representativeness of mammography exemplars in comments appearing with online news articles. The content analysis provided the stimuli for the experiment and enhances the ecological validity of the experiment by closely replicating

the nature of comments as they appear in online news settings. Chapter 2 explores prior literature on content analyses of mammography news coverage and research on user-generated comments. It also outlines the rationale for the content analysis and the specific research questions addressed: 1) How was mammography covered in the news from 2009 to 2014?; 2) What is the nature of online reader commentary for these mammography news stories?; and 3) What is the nature of mammography exemplars in user-generated comments on online news articles about mammography, specifically in regards to prevalence, type, and representativeness of actual mammography outcomes? Chapter 2 goes on to present the content analysis methodology, results, and discussion.

Chapter 3 outlines the literature and theoretical background of the main experiment. Specifically, it reviews prior literature on the effects of media coverage of breast cancer and mammography and on the effects of news commentary. The theoretical background includes a review of the effect of exemplars on behavioral intentions and the effects of exemplars on risk perceptions. Chapter 3 goes on to set forth hypotheses regarding the effects of user-generated comments on readers' breast cancer risk perceptions and mammography intentions, including specific predictions about the effects of comments with exemplars versus comments without and the effects of false-positive exemplars versus mammogram-detected cancer exemplars. It also includes predictions about possible mediators of the effect of exemplars on risk perceptions and mammography intentions.

The main objective of Chapter 4 is to provide a detailed description of the experimental methods used to test the hypotheses proposed in Chapter 3. A randomized

online experiment assigned participants to one of eight conditions, with conditions varying on the presence or type of comments displayed: 1) no information control (NoInfo), 2) no comments control (NoComm), 3) false-positive comments without exemplars (FPNoEx), 4) mammogram-detected breast cancer comments with no exemplars (BCNoEx), 5) false-positive comments with exemplars (FPEx), 6) mammogram-detected breast cancer comments with exemplars (BCEx), 7) false positive comments with exemplars removed (FPExRem), or 8) mammogram-detected breast cancer comments with exemplars removed (BCExRem). Chapter 4 also presents an overview of experimental measures, stimuli, and an analysis plan. Full survey instruments and sample stimuli are available in the appendices.

Results presented in Chapter 5 and Chapter 6 address both Objective 2 and Objective 3. Chapter 5 presents the results of the experiment testing the effects of comment conditions on mammography intentions (i.e., the intention to have a mammogram in the next two years and the intention to wait until age 50 to have a mammogram). It also presents results from moderation and mediation analyses that attempt to elucidate the mechanisms of action underlying predicted, unexpected, and failed effects of comments.

Chapter 6 presents the results of the experiment that address the effects of comments on risk perceptions, including perceived risk of developing breast cancer, perceived risk of a positive mammogram, and perceived risk of a false positive mammogram. It also includes results of moderation and mediation analyses of the effects of comments presented.

The final chapter, Chapter 7, provides a summary of the results of the dissertation and a general discussion of these results. This chapter includes an overview of the strengths and limitations of the research, a discussion of directions for future research, and an overall conclusion.

CHAPTER 2
EXEMPLARS IN USER-GENERATED COMMENTARY ON MAMMOGRAPHY
NEWS COVERAGE

Introduction

Routine mammography is recommended as the primary breast screening modality for average-risk women between the ages of 50 and 74 years of age (U.S. Preventive Services Task Force [USPSTF], 2009; USPSTF, 2016). The American Cancer Society recommends beginning routine screening even earlier, at age 45 (Oeffinger et al., 2015), making the topic of mammography one that is pertinent for a large segment of the population and also somewhat controversial. Research suggests that the benefit of mammography for young women is quite modest and that regular mammography screening before age 50 may put women at high risk for false positive results, overdiagnosis, and overtreatment (U.S. Preventive Services Task Force, 2009; Pace & Keating, 2014). In fact, Pace and Keating (2014) estimate that if 10,000 40-year-old women are screened annually with mammography for 10 years, 3,680 (37%) will have normal mammograms all 10 years, 6,130 (61%) will experience at least one false positive (including 700 or 7% who will have an unnecessary biopsy), and 190 (2%) will be diagnosed with breast cancer (including between 1 and 16 women, or 0.01% - 0.16%, whose death will be averted due to mammography screening). Despite the significant risks, women continue to overestimate the benefits of mammography (Domenighetti et al., 2003), and the general public remains enthusiastic toward screening (Schwartz, Woloshin, Fowler, & Welch, 2004). In addition to the role played by medical

professionals, professional medical organizations, and advocacy organizations that continue to promote screening, media coverage may be partially to blame for this mismatch between perception, attitudes, and reality.

Prior research has shown that mammography behaviors are influenced by media coverage (Yanovitzky & Blitz, 2000), but this research does not take into account the effect of comments generated by readers in response to mammography news presented in an online context. The presence of comments on online news stories is increasingly common (Weber, 2014), and research has shown that comments may affect readers' opinions and perceptions (Lee, 2014). Unfortunately, little is known about the nature of comments that are generated in response to mammography news coverage. Specifically, though we know that exemplars, or "illustrative individual cases" (Brosius & Bathelt, 1994, p. 48), are present in user-generated comments (Holton, Lee, & Coleman, 2014; Len-Rios, Bhandari, & Medvedeva, 2014), little is known about how accurately these exemplars represent the typical mammography experience, including the ratio of false-positive results to mammography-detected cancer. Exemplars are of particular interest because research has shown they can have greater effects on health risk perceptions than statistical information (Zillmann, 2006). Similarly, narrative evidence has been shown to have a greater effect on behavioral intentions than statistical evidence (Zebregs, van den Putte, Neijens, & de Graaf, 2015). Thus, exemplars in comments could potentially have more powerful effects on intentions and risk perceptions than the information in the articles with which they appear.

Though more extensive research is needed to fully understand the complex media environment surrounding mammography and user-generated commentary on mammography, this limited content analysis was specifically designed as a preliminary step toward Study 2, which will investigate the effects of exemplars in user-generated commentary on mammography news articles on the readers of these comments. First, this content analysis quantifies the prevalence, types, and representativeness of exemplars appearing in a segment of reader comments on mammography articles, which was necessary to help justify the legitimacy of the research questions addressed by Study 2. Secondly, and more practically, it provides a pool of user-generated comments (both with and without exemplars) from an online news source that can be used as experimental stimuli, which will enhance the ecological validity of Study 2. However, this content analysis does not attempt to provide a comprehensive analysis across media platforms (e.g., television, social media, etc.), nor does it seek to sample from or be representative of multiple news sources.

Background

Analyses of News Coverage of Mammography

To understand the nature of user-generated commentary, one must first understand the nature of news coverage of mammography in recent years. Several newsworthy events have shaped the nature of news coverage about mammography over the last five years: changing USPSTF recommendations regarding breast cancer screening, studies about the efficacy of mammography, the emergence of breast tomosynthesis (also called 3D mammography) as a new screening tool, legislation about

breast density notification, Susan G. Komen withdrawing funding from Planned Parenthood, and celebrity breast cancer cases. The change in USPSTF recommendations alone was heavily covered in the media, and much of the immediate coverage was critical of the new guidelines (Squiers et al., 2011). However, there is little research about coverage of other mammography topics that have received coverage in recent years. While there have been content analyses of news coverage of cancer in general (e.g., Slater, Long, Bettinghaus, & Reineke, 2008), breast cancer (e.g., Atkin, Smith, McFeters, & Ferguson, 2008), mammography (e.g., Schwartz & Woloshin, 2002), and the USPSTF controversy (e.g., Squiers, Holden, Dolina, Kim, Bann, & Renaud, 2011) few examine coverage over time, and none incorporate an analysis of comments.

At least three recent content analyses examining cancer news coverage have discovered that, compared to actual cancer incidence rates, breast cancer is disproportionately represented in media coverage. Using a representative sample of national and local news from television, newspaper, and magazine sources, Slater, Long, Bettinghaus, and Reineke (2008) analyzed cancer news coverage from 2002 and 2003. Slater et al. found that breast cancer was over-represented in media coverage compared to both its actual incidence and mortality rate in the population at the time; breast cancer was mentioned in 29.6% of newspaper stories about cancer (with the next most frequently mentioned cancer being colon cancer, mentioned in only 11.3% of newspaper stories about cancer). Another recently completed content analysis attempts to show change in cancer news coverage trends across three different time points, including 1977, 1980, and 2003. Jensen, Moriarty, Hurley, and Stryker (2010) examined cancer stories

appearing in the top 50 U.S. newspapers during a time frame in 2003, which closely replicated methods used by Greenberg, Freimuth, and Bratic (1979) and Freimuth, Greenberg, DeWitt, and Romano (1984) to complete prior content analyses of cancer coverage. Jensen et al. found that breast cancer was consistently overreported, compared to its actual incidence relative to other cancers, across the three time periods reported. Finally, Hurley, Riles, and Sangalang (2014) analyzed cancer news from the top four online news sources (Google News, Yahoo! News, MSNBC.com, and CNN.com) over a composite month in 2008. Consistent with previous content analyses of print media coverage, they found that breast cancer was the most prevalent cancer mentioned. Of breast cancer articles analyzed, 29% were about detection (presumably many of those were about mammography), 23% were about prevention, and 22% were about treatment.

With the exception of Hurley, Riles, and Sangalang (2014), prior analyses of broad cancer news coverage do not comment on the prevalence of mammography coverage or the use of narratives or exemplars in the articles. Others, however, have examined the nature of mammography coverage in the media. Wells, Marshall, Crawley, and Dickersin (2001) analyzed newspaper reports on mammography appearing in high circulation US newspapers from 1990 to 1997. Wells et al. found that the most common theme of these articles was the issue of screening mammography for women ages 40 to 49. Overall, articles were mostly supportive for screening in these women; of the 160 articles with quotes, 26% included quotes supporting mammography for women in their 40s without presenting quotes from the opposite viewpoint, 15% had quotes from both perspectives, and 7.5% had quotes regarding reservations about screening women in this

age group. Of 619 quotes total in 160 articles, 38 quotes came from members of the public. Wells et al. report that these quotes often involved a member of the public describing her own experience with breast cancer or mammography. Atkin, Smith, McFeters, and Ferguson (2008) focused specifically on the content of breast cancer news coverage in leading newspapers, newsmagazines, and television during 2003 and 2004. They found that 23% of breast cancer news stories analyzed referred to breast cancer detection and 17% overall referred specifically to mammography, with most of the articles dealing with topics of effectiveness and the age at which women should begin having mammograms. They also examined the prevalence of personal narratives in breast cancer news coverage, finding that 48% of stories primarily about detection cited a “personal case” as a source.

In addition to analyses of general mammography coverage, some authors have focused on coverage of various mammography controversies over time, including the 1997 National Institutes of Health (NIH) consensus panel recommendation against routine screening of women in their 40s and subsequent reversal, a 2000 meta-analysis on the efficacy of mammography published in *The Lancet*, and the 2009 USPSTF breast cancer screening recommendations. Schwartz and Woloshin (2002) analyzed media coverage for the two weeks following the 1997 National Institutes of Health (NIH) consensus panel recommendation against routine screening of women in their 40s and for the two weeks following the National Cancer Institute’s (NCI) subsequent reversal of that decision by collecting stories from the top 10 US newspapers and 3 major television networks. Despite acknowledging the uncertainty regarding whether women in their 40s

should have mammograms following the initial NIH recommendation, 59% of the news items still suggested that these women should be screened. Following the NCI reversal, the expression of uncertainty dropped significantly and 96% of news items suggested that women in their 40s should be screened. Though Schwartz and Woloshin reported on the sources of quotations found in these stories, it is difficult to tell how many included mammography exemplars, as quotes from breast cancer advocacy groups and survivors are reported together (17 quotes across 51 stories). They did note that the American Cancer Society was frequently quoted (36 times across 51 stories), while the USPSTF, which recommended against routine screening for women aged 40 to 49 at the time, was only quoted once across all of the news stories. Holmes-Rovner and Charles (2003) also tracked news coverage following a mammography controversy, examining news clippings in the United Kingdom for two weeks following the release of a meta-analysis in *The Lancet* that suggested mammography did not decrease breast cancer mortality and was unjustified. They found that approximately 20% of the articles included a patient testimonial, and that testimonials use increased over time; articles published closer to the release of the study were more focused on the technical aspects of the study than those published during week two of coverage. Holmes-Rovner and Charles note that many articles, particularly those with patient testimonials, encouraged women to disregard the findings of this meta-analysis and continue screening. Findings from Schwartz and Woloshin and from Holmes-Rovner and Charles suggest that news coverage of mammography controversies is often skewed toward encouraging screening rather than emphasizing uncertainty and the need for informed decision-making.

The 2009 release of updated USPSTF breast cancer screening recommendations is one of the most recent mammography controversies to be studied. Squiers et al. (2011) analyzed newspaper and social media coverage of the new recommendations in the weeks following their release. They found that 63% of the news articles mentioned the guidelines for women in their 40s (the recommendations that changed most drastically), while only 34% discussed the guidelines for women in their 50s, suggesting an emphasis on the more controversial aspects of the recommendations. The valence of the newspaper articles was also skewed; 55% were unsupportive of the new recommendations, 31.3% were supportive, and 13.8% were neutral.

Research by Jensen et al. (2014), which found that self-reported news consumption was positively related to overestimation of the prevalence of breast cancer, suggests that the overrepresentation of breast cancer in the news affects breast cancer risk perceptions. Exposure to news stories and comments that overrepresent the benefits of mammography while downplaying risks may have similar effects on mammography risk perceptions and intentions. Unfortunately, prior content analyses of breast cancer and mammography coverage do not provide insights into the user-generated comments that accompanied news coverage of mammography, meaning that some of the mammography information to which readers have been exposed has remained unanalyzed. These gaps in research have prompted the following research questions:

RQ1: How was mammography covered in online news from 2009 to 2014 (with a particular emphasis on valence toward mammography and presence and type of exemplars)?

RQ2: What was the nature of online reader commentary for these mammography news stories (with a particular emphasis on valence toward mammography and presence and type of exemplars)?

Prior Research on User-Generated Commentary

In addition to the lack of content analyses of media coverage that incorporate an analysis of comments, research in general on user-generated comments about mammography that appear in the public domain is limited. Existing literature on user-generated content about breast cancer and mammography is primarily from social media (Abramson, Keefe, & Chou, 2015; Lyles, López, Pasick, & Sarkar, 2013; Thackeray, Burton, Giraud-Carrier, Rollins, & Draper, 2013). While these studies provide insight into the content of comments, they do not provide information on the interplay between articles and comments, nor do they provide insight into the presence or role of exemplars in comments. The limited research that does exist on the prevalence of exemplars in comments on health news (Holton, Lee, & Coleman, 2014; Suran, Holton, & Coleman, 2014) is not specific to mammography or breast cancer.

Two of the analyses of online comments related to breast cancer and mammography come from Twitter. Thackeray et al. (2013) conducted an analysis of all tweets related to breast cancer during October 2012 to capture Twitter coverage of breast cancer awareness month. Using automated text analysis, they determined that 3.1% of all 1.3 million original tweets were about breast cancer detection, including, but not limited to, mammography. The majority of tweets were about wearing pink and participating in fundraisers and awareness activities. Unfortunately, no further information was given

about the detection tweets, and it is unknown whether they included exemplars (which would have been necessarily brief given the 140-character limit of tweets). Lyles et al. (2013) also coded a small segment of mammography tweets appearing on Twitter during a five-week period in early 2012. Of 271 messages about mammograms, 25% included mammography exemplars. These included women sharing experiences with appointments, negative sentiment toward mammogram experiences, mammogram results, and references to the mammograms of friends or family members. The analysis by Lyles et al. was described as exploratory, and only used tweets classified as “top tweets” (those with higher levels of engagement from other Twitter users) were included, thus these results may not be representative of all tweets about mammography. Additionally, due to the length limitations placed on tweets by the Twitter platform, any exemplars or narratives included in the tweets analyzed would be incredibly brief and would not allow for detailed descriptions of mammography outcomes. Additionally, any exemplars that do exist would be unlikely to produce substantial cognitive involvement or narrative transportation. Thus, Twitter is not an ideal source for finding and quantifying the presence of mammography exemplars in user-generated commentary.

Analyses of comments on Facebook also provide limited insights into the nature of user-generated comments about mammography. Abramson, Keefe, and Chou (2015) analyzed wall posts from October 2010 from the Facebook page of a nonprofit organization committed to funding free mammograms and spreading breast cancer awareness. Abramson et al. found that users often used the Facebook wall of this particular organization as a place to share personal breast cancer stories and anecdotes,

though the prevalence and type of stories was not quantified. Importantly, they also note that users were allowed to post health information, opinions, and stories without intervention or apparent oversight from the sponsoring organization, which allows for the spread of misinformation. The same may be true for user-generated comments on some online news sites.

Finally, though there is not available literature on user-generated comments on breast cancer and mammography news articles, there are limited analyses of how certain health article characteristics may affect the types of comments generated by readers. Though the research in this area focuses on frames and not the presence of exemplars, the presence of episodic frames may serve as a proxy for exemplars. Holton, Lee, and Coleman (2014) explored the effects of framing of online health news on the volume, content, and framing of reader comments. Overall, 0.34 sentences per comment were episodically framed, which gives some indication of the prevalence of exemplars, though the authors do not report the average number of sentences per comment. They found that when articles had gain frames, readers were more likely to share personal stories in the comments. Interestingly, episodically framed articles were not more likely to have episodically framed comments. While Holton et al. examined all health topics, Suran, Holton, and Coleman (2014) looked specifically at whether the frames of comments were associated with certain health topics, including cancer. Though some topics were associated with a higher likelihood of episodically-, thematically-, gain-, or loss-framed comments, Suran et al. did not find an association between an article being about cancer and the frame of the comments.

Because of a general dearth of research on user-generated comments in the online news arena and, specifically, a lack of attention to the prevalence of exemplars in these comments, I propose the following research question:

RQ3: What is the nature of mammography exemplars in user-generated comments on online news articles about mammography, specifically in regards to prevalence, type, and representativeness of actual mammography outcomes?

RQ4: How are exemplars in mammography articles related to exemplars found in user-generated news comments?

Methods

Because this content analysis was designed to provide background information and stimuli for Study 2, it includes a limited analysis of news articles and associated reader comments related to mammography over a five year period, beginning with the release of the USPSTF revised breast screening recommendations in November 2009. *The New York Times* was chosen as the source for this content analysis for its broad readership, its role in agenda-setting (Yanovitzky & Blitz, 2000), and its online commenting system, the archives of which are well-maintained and easily accessible through the application program interfaces (APIs) provided by *The New York Times*. However, *The New York Times* is not representative of all news sources, nor is its readership representative of news readers in general. Nevertheless, this source is useful for discovering the kinds of comments generated, gauging the relative frequency of different types of comments, and collecting stimulus materials for experimental study.

Article Collection Procedure

To collect mammography stories appearing in *The New York Times* in the five years following the release of the 2009 USPSTF mammography guidelines, the author first conducted a search using LexisNexis for articles or blog posts appearing between November 1, 2009 and December 31, 2014 that mentioned mammography or breast cancer screening by using the search string mammogra! OR ("breast cancer" w/2 screen!). The author then searched the NYTimes.com website for the same date range using the following search string: mammogram OR mammography OR "breast cancer screening" OR "screening for breast cancer" OR "screen for breast cancer."¹

Article Inclusion Criteria, Measures, and Coding Procedure

For each article retrieved in the searches described above, the author recorded basic information, including the title; any alternate titles, if applicable (since an article's print and web titles sometimes differed); the date of publication; whether or not the article was included in the LexisNexis search results, whether or not the article was included in the NYTimes.com search results; the article type (news article, opinion/editorial, magazine article, blog post, letter/reader reaction, other);² and whether the article was a duplicate of another article appearing in the search. The full codebook is

¹ The NYTimes.com website uses a different search syntax than LexisNexis, so it was not possible to exactly replicate the search string used in LexisNexis.

² For results from the NYTimes.com search, it was sometimes difficult to ascertain the article type because the URLs provided in the search results often pointed only to a blog post, even if the news article appeared in both print and as a blog post. For this reason, article type for these results may be less accurate than for articles found through LexisNexis.

available in Appendix A. Articles were excluded from the analysis if the article type was “letters/reader reactions” or “other” (which included death notices, engagement and wedding announcements, corrections, book reviews, and lists of headlines) or if they were duplicates of an article already in the dataset. If an article appeared in the search results as both a blog post and an article, the blog post was coded and the print version was excluded as a duplicate, as online articles were typically more complete and correct than versions appearing in print. Beyond these inclusion criteria, articles were included if either of the following was true: 1) the article title included a reference to mammograms, mammography, breast screening, or breast cancer screening, or 2) at least 50% of the paragraphs in the story included a reference to mammograms, mammography, breast screening, or breast cancer screening.

The unit of analysis was the full article. Articles that were included in the dataset were coded for content variables, including whether or not the online version had comments, mentioned the 2009 mammography guidelines issued by the USPSTF, or mentioned any of the following organizations: Susan G. Komen for the Cure, the American Cancer Society, the National Cancer Institute, the USPSTF, or the American College of Radiology. Articles were also coded for overall valence with regard to mammography and could be coded as “more enthusiastic than cautious toward mammography,” “balanced/neutral,” or “more cautious than enthusiastic toward mammography.” Finally, articles were coded for the presence of exemplars, including breast cancer exemplars (a mention of an individual or individuals who was/were diagnosed with breast cancer), mammography exemplars (a mention of an individual or

individuals who had a mammogram or mammograms), or exemplars who chose to delay or not to undergo mammography. If a mammography exemplar was present, the coder went on to record the type of mammography exemplar present in the article. The types of exemplars included false positives (women who received a call-back or follow-up for additional screening, biopsy, etc.), cancer outcomes (women who had a screening mammogram that found a cancer), no false positives (women who have a history of mammograms but no false positives and no cancer diagnoses), lumps or breast cancer found without mammography (this includes women who had a lump detected in some way and went on to have a diagnostic mammogram as well as women who had a false negative mammogram and later found a lump or cancer), and false negatives (women who report that they had cancer that was missed by a mammogram). These categories were not exclusive, and an article could be coded as including multiple or overlapping exemplar types.

Using the measures outlined above, the author coded all of the articles retrieved in the search for basic information, inclusion criteria, and content. A second coder was trained and recoded a 10% sample of articles to determine inter-coder reliability for inclusion and content. Inter-coder reliability was calculated using Krippendorff's alpha and was judged to be acceptable for all variables, including the following: meeting inclusion criteria ($\alpha = 1$), having comments ($\alpha = 1$), mentioning 2009 USPSTF guidelines ($\alpha = .87$), mentioning Susan G. Komen for the Cure ($\alpha = 1$), mentioning the American Cancer Society ($\alpha = 1$), mentioning the National Cancer Institute ($\alpha = 1$), mentioning the USPSTF ($\alpha = .74$), mentioning the American College of Radiology ($\alpha = 1$), valence ($\alpha =$

.71), inclusion of breast cancer exemplars ($\alpha = 1$), inclusion of exemplars who delay or do not get a mammogram ($\alpha = 1$), inclusion of mammography exemplars ($\alpha = 1$), inclusion of false positive exemplars ($\alpha = 1$), inclusion of exemplars with cancer outcome ($\alpha = 1$), inclusion of exemplars with no false positive ($\alpha = .86$), inclusion of exemplars with a lump or breast cancer detected without a mammogram ($\alpha = .86$), and false negative exemplars ($\alpha = 1$).

Comment Collection Procedure

For articles that were included in the analysis and for which the online versions had comments, all comments were collected using the *New York Times* Community API (http://developer.nytimes.com/docs/community_api/The_Community_API_v3/).

Comments could be retrieved through the API for all but four of the articles. For each of these remaining articles, the author manually collected all comments from the *New York Times* website. For each comment, the author recorded the author name, author location, comment date, whether or not the comment was classified as an “NYT Pick,” the number of times the comment was recommended by other readers, the full text of the comment, and the number of words in each comment. Due to changes in the *New York Times* comment structure over time, author location, “NYT Pick” status, and number of times recommended were not available for all comments.

Comment Inclusion Criteria, Measures, and Coding Procedure

From the total pool of 5,858 comments, a stratified random sample was constructed by drawing 20% of each article’s comments ($n = 1,185$). When an article had fewer than five comments, one comment was randomly selected and included so that all

articles were represented. Comments from this sample were included for further analysis if they mentioned mammography or were judged as being about mammography. The codebook for comment inclusion and content is available as part of Appendix A, and the full comment was the unit of analysis. Those comments that were included in the analysis were then coded for valence with regard to mammography: “more enthusiastic toward mammography than cautious,” “balanced/neutral—neither more enthusiastic nor more cautious,” or “more cautious toward mammography than enthusiastic.” Comments included in the analysis were also coded for the presence of different types of exemplars, including breast cancer exemplars, exemplars who chose to delay or not to undergo mammography, and mammography exemplars. If a mammography exemplar was present, the coder went on to record the type of mammography exemplar present in the comment. As described in the above section on article coding, the types of exemplars included false positives, cancer outcomes, no false positives, lumps or breast cancer found without mammography, and false negatives. As with the articles, these categories were not exclusive, and a comment could be coded as including multiple or overlapping exemplar types.

The author coded the entire sample of comments. A second coder was trained and recoded a randomly drawn 10% sample of comments ($n = 100$) to determine inter-coder reliability. Inter-coder reliability was calculated using Krippendorff’s alpha and was judged to be acceptable for most variables, including meeting inclusion criteria ($\alpha = .81$), valence ($\alpha = .92$), including a breast cancer exemplar ($\alpha = .95$), including an exemplar who chooses not to screen ($\alpha = .88$), including a mammography exemplar ($\alpha =$

.85), presence of a false-positive exemplar ($\alpha = .78$), presence of a cancer outcome exemplar ($\alpha = .74$), and presence of an exemplar with a lump or breast cancer detected without mammography ($\alpha = .83$). Krippendorff's alpha for the presence of exemplars who had a history of normal mammography results was .53 (88% agreement), which falls below an acceptable level of agreement. This may be partly due to the rare nature of this type of exemplar (appearing only 13 times in 576 comments).

Analysis

Statistical analyses were performed using Stata/IC 13.1 for Windows. Analyses included basic descriptive statistics and chi-square analyses to examine the relationship between comment exemplar type and comment valence. Logistic regression with standard errors clustered by article were used to examine the effect of exemplars in the article on exemplars in the comments on that article.

Results

Article Collection and Inclusion

The LexisNexis search yielded 485 articles; the search of NYTimes.com yielded 319. After accounting for overlap between the LexisNexis and NYTimes.com search, there were 559 entries in the database. Of these, 43 were excluded because they were duplicates,³ 349 were excluded because they were not primarily about mammograms, and

³ An entry was considered a duplicate only if it appeared twice within one of the two searches (e.g., if the same article appeared twice in the LexisNexis search, one of the entries was coded as a duplicate and excluded from the database). An article appearing only once in both the LexisNexis search and the NYTimes.com search would be coded as an overlapping article, not a duplicate.

96 were excluded because they were not news articles, opinion/editorial articles, magazine articles, or blog posts. The remaining 71 unique articles were included in the analysis. Article source and type by inclusion status are presented in Table 2.1. The full list of articles included is available in Appendix B.

Table 2.1

Article Source and Type by Inclusion Status

	Included, <i>n</i> = 71	Excluded, <i>n</i> = 488
Found through LexisNexis search only, <i>n</i>	2	238
Found in both LexisNexis and NYTimes.com search, <i>n</i>	49	196
Found in NYTimes.com search only, <i>n</i>	20	54
Article type:		
News article, <i>n</i> (%)	37 (52)	221 (45)
Opinion/editorial, <i>n</i> (%)	7 (10)	44 (9)
Magazine article, <i>n</i> (%)	2 (3)	6 (1)
Blog post, <i>n</i> (%)	25 (35)	113 (23)
Letter/reaction, <i>n</i> (%)	0 (0)	48 (10)
Other, <i>n</i> (%)	0 (0)	56 (11)

Note. Percentages may not add to 100 due to rounding.

Article Characteristics and Content

Article characteristics and content are reported in Table 2.2. Over a third of the articles on mammography over the five year period were published in November and December of 2009, following the announcement of the updated USPSTF

recommendations. A majority of the articles included in the analysis (54%) mentioned the 2009 USPSTF guidelines. Relevant stakeholders mentioned in the articles varied, with the most commonly mentioned being the USPSTF (mentioned in 56% of articles), followed by the American Cancer Society (mentioned in 41% of articles). Roughly one-quarter of articles (27%) included at least one breast cancer exemplar, and the same number included a mammography exemplar (15 articles, or 21%, included both breast cancer and mammography exemplars). Of those that included a mammography exemplar, mammogram-detected cancer exemplars were most prevalent (42%), followed by an equal prevalence of exemplars with cancer detected without a mammogram and normal mammograms (32% each). A majority (54%) of the articles were judged as being neutral or balanced toward mammography. Of the 71 articles, 32 allowed reader comments, and the mean number of comments was 183 ($SD = 206$).

Table 2.2

Characteristics and Content of Articles Included in Analysis

Article characteristic	<i>n</i> (%)
Date of publication:	
November – December 2009	25 (35.2)
January – December 2010	9 (12.7)
January – December 2011	6 (8.5)
January – December 2012	8 (11.3)
January – December 2013	6 (8.5)

January – December 2014	17 (23.9)
Article content:	
Mention 2009 USPSTF guidelines	38 (54)
Mention Susan G. Komen for the Cure	8 (11)
Mention American Cancer Society	29 (41)
Mention National Cancer Institute	11 (15)
Mention USPSTF	40 (56)
Mention American College of Radiology	10 (14)
Includes breast cancer exemplar	19 (26.8)
Includes exemplar who chose to delay or not have mammogram	4 (5.6)
Includes mammography exemplar	19 (26.8)
Mammography exemplar type: ^a	
Mammogram-detected cancer exemplar	8 (42.1)
False-positive mammogram result exemplar	4 (21.1)
Exemplar with lump or breast cancer detected through means other than mammography	6 (31.6)
Exemplar with normal mammogram	6 (31.6)
Article valence with regard to mammography:	
Enthusiastic toward mammography	13 (18)
Balanced/neutral	38 (54)

Note. $N = 71$. USPSTF is the U.S. Preventive Services Task Force.

^a Some articles with mammography exemplars did not specify the outcome of the mammogram and articles could include more than one type of exemplar, thus specific exemplar types do not add to 19, but percentages are calculated out of 19.

Comment Collection and Inclusion

When an article was included in the analysis and the online version had comments, all of that article's comments were collected. The total number of comments for all articles was 5,858. Of the 5,858 comments in the full database, 145 were classified as "NYT picks." Of those for which the number of "recommends" was available ($n = 5,281$), the mean number of recommends was 12.1 ($SD = 28.5$). The mean length of comments was 99.7 words ($SD = 84.9$). A random sample of 20% of comments ($n = 1,185$), stratified by article, was drawn for detailed analysis. When an article had fewer than five comments, one comment was randomly selected. Of the 1,185 comments drawn, 678 were judged as being related to mammography and included for detailed analysis.

Comment Characteristics and Content

Characteristics and content of comments included in the detailed analysis are presented in Table 2.3. The overall valence of comments was almost evenly split across the three categories of "enthusiastic toward mammography," "balanced/neutral," and

“cautious toward mammography.” Roughly one-third of comments (208 or 30.8%) included a mammography exemplar, and the frequency of types of exemplars is presented in Table 2.3. Mammogram-detected cancer exemplars were the most common, followed by exemplars with lumps or breast cancer detected through means other than a mammogram, followed by false-positive exemplars. Exemplars reporting a history of normal mammogram results were least common. Slightly more than half of the comments coded did not include any exemplars (382 or 56.3%).

Table 2.3

Characteristics and Content of Comments Included in Analysis

Comment characteristic	<i>n</i> (%)
Comments included in analysis (% of all comments)	678 ^a (57.2)
Comment valence with regard to mammography:	
Enthusiastic toward mammography (% of included comments)	222 (32.8)
Balanced/neutral (% of included comments)	209 (30.9)
Cautious toward mammography (% of included comments)	246 (36.3)
Comment content:	
Comments including breast cancer exemplar (% of included comments)	192 (28.4)
Comments including exemplar who chose to delay or not have mammogram (% of included comments)	63 (9.3)

Comments including mammography exemplar (% of included comments)	208 (30.8)
Mammography exemplar type: ^b	
Comments with mammogram-detected cancer exemplar (% of mammography exemplar comments)	86 (41.3)
Comments with false-positive mammogram result exemplar (% of mammography exemplar comments)	39 (18.8)
Comments with exemplar with lump or breast cancer detected through means other than mammography (% of mammography exemplar comments)	50 (24.0)
Comments with exemplars with normal mammograms (% of mammography exemplar comments)	15 (7.2)
Comments without exemplars (% of included comments)	382 (56.3)
Nonexemplar comments about false-positive mammograms (% of comments without exemplars)	67 (17.5)

Nonexemplar comments about mammogram-detected breast cancer (% of comments without exemplars) 92 (24.1)

Note. ^a Out of a total sample of 1,185 comments. ^b Some comments with mammography exemplars did not specify the outcome of the mammogram and comments could include more than one type of exemplar, thus specific exemplar types do not add to 208.

Results from further analysis of the relationship between the presence of different types of exemplars and comment valence are presented in Table 2.4. Comments that include breast cancer exemplars are more enthusiastic toward mammography and less neutral or cautious than comments that do not include breast cancer exemplars. The relationship between valence and mammography exemplar appears to vary by the type of exemplar present; comments with mammogram-detected cancer exemplars were more enthusiastic toward mammography, while those with false-positive exemplars were more cautious toward mammography.

Table 2.4

Exemplar Type by Comment Valence

Comment valence			χ^2
Enthusiastic,	Neutral,	Cautious,	

Exemplar type	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Any breast cancer exemplar:				
Present	120 (62.5)	42 (21.9)	30 (15.6)	110.1***
Not present	102 (21.1)	166 (34.4)	215 (44.5)	
Any mammography exemplar:				
Present	100 (48.1)	39 (18.8)	69 (33.2)	36.6***
Not present	121 (26.0)	169 (36.3)	176 (37.8)	
Mammogram-detected cancer:				
Present	73 (84.9)	8 (9.3)	5 (5.8)	83.5***
Not present	27 (21.6)	33 (26.4)	65 (52.0)	
False-positive mammogram:				
Present	7 (18.0)	5 (12.8)	27 (69.2)	28.6***
Not present	93 (54.1)	36 (20.9)	43 (25.0)	
Lump or breast cancer detected without mammography:				
Present	17 (34.0)	19 (38.0)	14 (28.0)	14.6**
Not present	83 (51.6)	22 (13.7)	56 (34.8)	
Normal mammogram:				
Present	6 (40.0)	1 (6.7)	8 (53.3)	3.5

Not present	94 (48.0)	40 (20.4)	62 (31.6)
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Note. **p < .01, ***p < .001.

Relationship between Article Exemplars and Comment Exemplars

Results from an analysis of the relationship between the presence of exemplars in articles and exemplars in comments is presented in Table 2.5. Overall, the presence of any exemplar in the article was associated with a significantly higher prevalence of exemplars in the comments. This overall relationship varied, however, among different types of exemplars. For example, there was no relationship between the presence of breast cancer exemplars in the article and breast cancer exemplars in comments, but there was a significant positive relationship between the presence of any mammogram exemplar in the article and the presence of mammogram exemplars in comments. There was also a marginally significant relationship between the presence of false positive exemplars in the article and false positive exemplars in the article. For all significant or marginally significant relationships, the pattern was the same: when articles included exemplars, the comments on those articles were also more likely to include exemplars.

Table 2.5

Effect of Presence of Article Exemplars on Presence of Comment Exemplars

	Article exemplar type		
Comment exemplar type	Not Present, <i>n</i> (%)	Present, <i>n</i> (%)	<i>OR</i> (<i>SE</i> , adjusted for

	clustering by article)		
Any exemplar			
Any exemplar:			
Not Present	214 (63.1)	171 (50.4)	1.68 (0.38)*
Present	125 (36.9)	168 (49.6)	
Breast cancer exemplar			
Breast cancer exemplar:			
Not Present	360 (71.1)	126 (73.3)	0.90 (0.20)
Present	146 (28.9)	46 (26.7)	
Exemplar who chooses not to have a mammogram			
Exemplar who chooses not to have a mammogram:			
Not Present	588 (92.6)	27 (62.8)	7.41
Present	47 (7.4)	16 (37.2)	(1.40)*** ^a
Mammography exemplar			
Mammography exemplar:			
Not Present	258 (74.6)	212 (63.9)	1.66 (0.38)*
Present	88 (25.4)	120 (36.1)	
Mammogram-detected cancer			
Mammogram-detected cancer:			
Not Present	510 (87.3)	82 (87.2)	1.01 (0.29)
Present	74 (12.7)	12 (12.8)	
False-positive mammogram			
False-positive mammogram:			
Not Present	538 (95.2)	101 (89.4)	2.37 (1.05) [†]
Present	27 (4.8)	12 (10.6)	
Lump or breast cancer detected without mammography			
Lump or breast cancer detected without mammography:	529 (93.6)	99 (87.6)	2.1 (0.95)

Not Present	36 (6.4)	14 (12.4)	
Present			
Normal mammogram			
Normal mammogram:			
Not Present	574 (97.6)	89 (98.9)	0.46 (0.49)
Present	14 (2.4)	1 (1.1)	

Note. ^aStata warns that this standard error may be unreliable because of small numbers. This estimate is based on only one article that included an exemplar who chose not to have a mammogram.

†p<.1, *p<.05, **p<.01, ***p<.001

Discussion

This chapter addresses Objective 1 of the dissertation, which is to describe the prevalence, content, and representativeness of mammography exemplars in comments on online news about mammography. This analysis provides insight into mammography newspaper coverage from 2009 to 2014, mammography-related comments generated by readers of online news, and the presence and characteristics of exemplars in reader comments.

RQ1 pertained to the media environment surrounding mammography coverage from 2009 to 2014. This analysis shows that the majority of the discussion of the 2009 USPSTF recommendations in *The New York Times* took place immediately following their announcement, meaning that prior analyses (Squiers et al., 2011) using media coverage from November 2009 through January 2010 are likely to have accurately captured coverage of that particular event. Overall, mammography coverage waned in the

years following 2009 but increased again in 2014 with the release of a new mammography study, introduction of a new screening method (tomosynthesis or “3-D” mammography), and increased attention to issues associated with breast density. Articles typically mentioned important sources or stakeholders relevant to mammography, and since a large portion of articles related to mammography in the study period were related to the USPSTF recommendations, they were often a cited source of information. The American Cancer Society and, less often, the American College of Radiology were typically included as sources who opposed the change in guidelines. The National Cancer Institute and Susan G. Komen for the Cure were only occasionally mentioned in mammography articles.

The valence with regard to mammography across articles was mostly balanced (54%), though there were slightly more articles that were more cautious toward mammography than enthusiastic (28% vs. 18%). This differs from other analyses of news controversy, such as coverage of the NIH mammography recommendations studied by Schwartz and Woloshin (2002) and coverage of the 2009 USPSTF recommendations studied by Squiers et al. (2011), which showed that media coverage tended to be more favorable toward mammography or unsupportive of recommendations against mammography. This difference is likely due to the vastly different nature of the present content analysis as compared to prior analyses of short-term coverage of mammography controversies, including differences in time frames and differences in sources. Because of the limited nature of the content analysis of coverage presented here, the main

emphasis should be on comments in response to the news coverage as opposed to the coverage itself.

RQ2 and RQ3 dealt with the general nature of online reader commentary on mammography news stories and the presence of exemplars. Of the comments included in the analysis, almost a third included a breast cancer exemplar and a 31% included at least one mammography exemplar.⁴ This is similar to the prevalence of mammography exemplars found in Twitter comments analyzed by Lyles, López, Pasick, and Sarkar (2013). Overall, the valence was almost evenly split among those who were more enthusiastic, neutral, or cautious toward mammography. On closer examination, however, it appears that valence varied widely across comments and was related to the presence and type of exemplars included. Comments with breast cancer exemplars and mammography exemplars were generally more enthusiastic about mammography than those without, which may mean that those in favor of mammography used personal stories of experiences with breast cancer to support their point while those who were cautious about mammography were less likely to include personal examples. However, further analysis of the relationship between valence and the presence of different types of mammography exemplars provides a more nuanced understanding. When comment authors included an exemplar in which a mammogram detected breast cancer, this was more likely to occur in the context of a comment that was enthusiastic toward

⁴ There were 120 comments that included both a breast cancer exemplar and a mammography exemplar, so while there is overlap, these categories do not represent the exact same set of comments.

mammography, but when the comment included an experience with a false-positive mammogram result, the valence was much more likely to be cautious (negative).

Comments that included an exemplar whose breast lump or breast cancer was detected without a mammogram were much more likely to be neutral toward mammography than comments that included other types of exemplars.

RQ3 also asked how representative mammography exemplars in comments are of actual mammography outcomes. Even using estimates of mammography outcomes for women between the ages of 60 and 69, for whom mammograms are most effective and result in the least amount of harm in the form of false positives and overdiagnosis, the balance of mammography results represented in the comments is highly skewed.

Research estimates predict that, for 10,000 women 60 years of age who are screened every year for 10 years, 438 (4.4%) will be diagnosed with invasive breast cancer or ductal carcinoma in situ (including those diagnosed with and without mammography), 4970 (49.7%) will experience at least one false-positive result but no cancer, and the rest will have mammograms with normal results (Pace & Keating, 2014). When these figures are contrasted with the distribution of mammography exemplars presented in Table 2.3, one can see that exemplars reporting mammogram-detected cancer and even exemplars reporting breast cancer detected without a mammogram are vastly overrepresented (45.6% and 24.0%, respectively), while exemplars that describe false-positive mammogram results or a history of normal mammograms are drastically underrepresented (17.5% and 7.6%, respectively). This finding raises concerns that an overrepresentation of mammogram-detected cancers and an under-representation of false-

positive mammogram results in comments could lead to skewed risk perceptions and mammography intentions in those exposed to these comments. Future research should examine the effects of exemplar type and balance on comment readers.

Finally, this analysis also provides insight into the relationship between the presence of exemplars in articles about mammography and exemplars in comments appearing with those articles (RQ4). The data show that articles with mammography exemplars are more likely to have comments that also have mammography exemplars. Further, articles with false positive exemplars are more likely to have comments with false positive exemplars, and articles with exemplars who chose not to have a mammogram are more likely to have comments with exemplars who report choosing not to have a mammogram. By looking specifically at the presence of exemplars and not the overall frame of the article, this adds to research by Holton, Lee, and Coleman (2014), who found that episodically framed health articles were not more likely to have episodically framed comments, and by Suran, Holton, and Coleman (2014), who did not find an association between an article being about cancer and the frame of the comments (i.e., articles about cancer were not more or less likely to have episodic comments). One possible explanation for the relationship between exemplars in the article and exemplars in the comments is the need for readers to connect with others who have had a similar experience as a way of affirming their own experience, particularly when they experienced an underrepresented outcome (e.g., a false positive) or they have made a decision that goes against norms (e.g., choosing not to have a mammogram). Future research should examine possible explanations for the association between

mammography exemplars in articles and mammography exemplars in comments (and the absence of this association for breast cancer exemplars), as one cannot rule out the possibility of a third variable that explains the association.

Due to the limited purpose for which it was designed, this content analysis has several characteristics that may restrict generalizability of the results to other sources, populations, or health topics. First, the choice of *The New York Times* as the source for articles and associated comments may limit the generalizability of findings to other sources of online news and commentary. Despite its wide readership, the *Times* is not a national newspaper and readers of *The New York Times* are more educated and more liberal than readers of other news sources such as *USA Today*, local daily newspapers, or television news (The Pew Research Center for the People & the Press, 2012). This may also mean that the comments generated vary in significant ways from comments that would be produced by readers of other online news sources. The analysis is further limited because it includes only newspapers and newspaper-associated blogs, which may not be representative of the full range of information about mammography to which people are exposed (such as through social media), and thus may not capture the full media environment surrounding mammography over the past five years. Finally, because this analysis focused specifically on mammography, the findings are not generalizable to news coverage of other screening procedures or health topics. Because breast cancer advocates are vocal supporters of mammograms (Murphy, 2010), the prevalence and type of exemplars in comments on mammography news coverage may be different than they would be for news coverage of other screening tests or health issues.

Despite the limitations, this analysis provides important insights and materials needed to develop further research in this area. Specifically, understanding the prevalence, type, and lack of representativeness of mammography exemplars present in comments is necessary for researchers interested in investigating the effects of these comments on readers. Knowing that exemplars present in comments are not representative of actual mammography outcomes may also have implications for news organizations or others who allow comments on online content and have the power to highlight certain comments (as *The New York Times* can by designating comments as “NYT Picks.”) They may choose to consider the representativeness of a particular exemplar before promoting it so as to improve the representativeness of exemplars, which have been shown to have effects on risk perceptions.

Conclusions

In summary, this content analysis of news coverage of mammography in *The New York Times* and its news blogs from 2009 to 2014 provides an overview of article and comment valence and content, with a particularly detailed look at the presence, type, and representativeness of exemplars in articles and comments. Across the five-year period studied, the plurality of news articles published appeared in the months following the release of the controversial 2009 USPSTF breast cancer screening recommendations. The majority of news articles were balanced or neutral toward mammography; of articles that were not neutral, slightly more stories were critical of mammography than wholly supportive. The valence of all comments toward mammography was also balanced overall, with almost equal numbers being enthusiastic, neutral, and cautious toward

mammography. However, results showed that valence varied significantly by exemplar type: comments with mammogram-detected cancer exemplars were more favorable toward mammography than comments with false-positive exemplars. Analyses also showed that the composition of mammography exemplar types was not representative of actual mammography outcomes, vastly overrepresenting mammogram-detected cancers and underrepresenting false positives and normal mammograms. The data also showed a positive relationship between the presence of exemplars in articles and the existence of exemplars in comments on news articles.

This enhanced understanding of the type and distribution of comments appearing in online news commentary has informed the design of my future research on the effects of comments on readers. Specifically, comments collected from this analysis will serve as stimuli for Study 2, which will examine the effect of comments with different types of exemplars on readers' mammography intentions and risk perceptions.

CHAPTER 3

THE EFFECTS OF ONLINE NEWS COMMENTARY ON READERS

The change in mammography recommendations in 2009 by the U.S. Preventive Services Task Force (USPSTF) triggered a wave of media coverage on mammography screening (Squiers et al., 2011). Celebrity diagnoses, new studies on the risks and benefits of mammography, a controversial decision by Susan G. Komen for the Cure to cease funding Planned Parenthood, and revised breast cancer screening recommendations from the American Cancer Society have kept mammography in the news over the last five years (see Study 1). Though there is a wide body of research examining the effects of online news on media consumers, the user-generated comments that often appear alongside online news articles are a relatively recent addition to news media and, as a result, are less well studied. The inclusion of user comments following news stories has become standard practice for many online news sources (Weber, 2014), and an estimated 25% of Internet users have commented on an online news story (Purcell, Rainie, Mitchell, Rosenstiel, & Olmstead, 2010). Of particular interest are the different types of user-generated comments that may appear, particularly comments that include exemplars—commenters describing their individual experiences. As shown in Study 1, readers frequently share personal experiences related to the news topic in the comment section of articles on mammography, and many of these exemplars had narrative qualities. This phenomenon is not limited to news stories about mammography, however. For example, Len-Rios, Bhandari, and Medvedeva (2014) found that 42% of

comments on articles about breastfeeding included personal experiences, as well, suggesting that this phenomenon may be widespread.

In the research proposed here, exemplars are broadly defined as “illustrative individual cases,” following an early definition by Brosius and Bathelt (1994, p. 48), and are thought to increase vividness and interest and be easily understood by message recipients (Brosius & Bathelt). Some scholars make distinctions between exemplars and anecdotes, narratives, and testimonials (e.g., Slater & Rouner, 1996), but other authors have equated the four concepts (e.g., Braverman, 2008).⁵ Though equating exemplars, anecdotal evidence, narratives, and testimonials is an oversimplification, thinking of them as related message types allows communication scholars to draw on a wide body of literature to make predictions about their effects. Despite the presence of a well-developed line of research on the effects of exemplars in news coverage (see Zillmann, 1999; Zillmann, 2002; Zillmann & Brosius, 2000), the effect of exemplars in user-

⁵ Exemplars have been defined as “illustrative individual cases” (Brosius & Bathelt, 1994, p. 48), “case descriptions,” “case presentations” (Zillmann, 1999, p. 70), or example cases that share the characteristics of a wider group of events (Zillmann, 2002). Anecdotes have been referred to as “examples,” as a type of evidence to be contrasted with statistical evidence (Hoeken & Hustinx, 2009, p. 492), or as “brief narrative[s]” (Slater & Rouner, 1996, p. 213). Narratives are perhaps the most well-studied of the four concepts, but researchers realize there is not a universally accepted definition of a narrative. Hinyard and Kreuter (2007) propose the following definition for use in the study of narratives in the health communication context: “A narrative is any cohesive and coherent story with an identifiable beginning, middle, and end that provides information about scene, characters, and conflict; raises unanswered questions or unresolved conflict; and provides resolution” (p. 778). Finally, testimonials are the most loosely defined of the four concepts and are hard to distinguish from exemplars or narratives. According to Braverman (2008), they “may include a personal story, a description of an individual experience or a personal opinion” (p. 666).

generated comments on readers is not well understood. Most research to date on the effects of comments focuses on the effects of comment valence (e.g., Lee, 2012; Lee & Jang, 2010), incivility (e.g., Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2014), or argument strength (e.g., Lee, 2014), while research on the effect of exemplars, narratives, testimonials, or anecdotes is lacking. To my knowledge, only one unpublished study has examined the effects of “story-oriented” news comments, finding that story-oriented comments had a stronger effect on opinions about the health topic of the article than fact-oriented comments (Witteman, Fagerlin, Exe, & Zikmund-Fisher, 2013). Further research is needed to understand what effects, if any, exemplars appearing in comments on stories about mammography may have on their readers’ breast cancer risk perceptions and mammography intentions. This research examines the effects of mammography exemplars appearing in user-generated online news comments on young female readers’ breast cancer risk perceptions, positive mammogram and false positive risk perceptions, and intentions to be screened for breast cancer. Findings will further understanding of mechanisms underlying the persuasive effects of exemplars and narratives on cancer-related risk perceptions and behavior, and they may have implications for news and public health organizations that allow online comments.

Introduction and Literature Review

Effects of Media Coverage of Breast Cancer and Mammography

Prior research demonstrates that media coverage of breast cancer and mammography can have powerful effects on audiences. These effects range from cognitive effects such as increased knowledge and confusion (Squiers et al., 2011) to

changes in behavior, including increased information seeking (Niederdeppe, Frosch, & Hornik, 2008) and even increased screening (Yanovitzky & Blitz, 2000). Prior studies include research on effects of general media coverage related to cancer as well as effects of coverage of specific news events related to breast cancer and mammography, including celebrity breast cancer cases and coverage of the 2009 USPSTF breast cancer screening recommendations.

The effects of media coverage of breast cancer and mammography on cognitive outcomes suggest that news coverage of a cancer-related topic influences public knowledge of that issue. For example, using a content analysis of media coverage and survey data, Stryker, Moriarty, and Jensen (2008) found that when cancer prevention behaviors were covered heavily in the news, self-reported attention to news stories predicted knowledge of these modifiable cancer risk factors. In addition to general effects of cancer-related news coverage on cognitive outcomes, there is also limited research on outcomes of media coverage of mammography. Squiers et al. (2011) conducted a content analysis of news stories and social media posts and a web-based survey following the release of the 2009 USPSTF breast cancer screening guidelines. They found that women who reported paying more attention to the new recommendations and those with higher levels of education were more likely to correctly identify the new mammography guidelines. Despite some improvements in knowledge associated with exposure to the guidelines, 40% of women ages 40-49 (the group most affected by the change in recommendations) reported being confused by the guidelines. Stryker et al. acknowledge that cancer-related information can sometimes be complex, and gaining

understanding may require a basic level of scientific literacy on the part of the audience. This may explain why, in some cases (e.g., Squiers et al., 2011), increased media attention can increase confusion, even when it leads to increased knowledge for some groups.

In addition to effects on cognitive outcomes such as knowledge and confusion, media coverage of cancer, in general, and of the 2009 change in mammography guidelines have been shown to have effects on information seeking. Through a content analysis of cancer media coverage and use of data from the Health Information National Trends Survey (HINTS), Niederdeppe, Frosch, and Hornik (2008) demonstrated that increases in cancer news coverage are positively associated with cancer information seeking. However, effects were moderated by attention to health news and family history of cancer, suggesting that effects of cancer-related media coverage on behavior depend, in part, on individual differences. Weeks, Friedenber, Southwell, and Slater (2012) provide evidence that the effects of media coverage may also depend on the nature of the coverage. In an analysis of mammography coverage in 2008 and following the 2009 USPSTF recommendations, Weeks et al. demonstrated that television coverage of mammograms predicted online searches for mammography information, and that this relationship was particularly strong during coverage of the guidelines controversy in 2009.

Though information seeking is a demonstrated behavioral outcome of media coverage of cancer and mammograms, it is perhaps more interesting to examine the effects of media coverage on actual screening behavior. Jones, Denham, and Springston

(2006) provide some evidence that there is an association between media consumed and mammography behavior at the individual level. In a survey of middle-aged women, they found a positive association between reported exposure to news magazine articles about breast cancer and mammography behavior. Jones et al. did not, however, attempt to control for other variables that could explain both the higher media exposure and the mammography behavior other than the presence of a family member with breast cancer. In contrast, Yanovitzky and Blitz (2000) used time series analysis of national survey data in conjunction with a content analysis of mammography-related media coverage to examine the relationship between media coverage and mammography behavior at the population level. They found a significant relationship between prior month level of national mammography media coverage and current month level of mammography screening for women over the age of 40 during the study period, which provides evidence for a causal order between media coverage and screening.

Finally, several cases have also demonstrated the powerful effects that media coverage of celebrity breast cancer cases can have on breast cancer screening behaviors. Early examples include the effects of media coverage following breast cancer diagnosis announcements by former first ladies Betty Ford (Fink et al., 1978) and Nancy Reagan (Lane, Polednak, & Burg, 1989) on breast cancer screening; both appeared to contribute to increases in screening. In more recent years, an Australian study documented that media coverage of singer Kylie Minogue's breast cancer diagnosis was linked to increases in mammography appointments made in the weeks following the news coverage (Chapman, McLeod, Wakefield, & Holding, 2005). These effects were

especially pronounced for young women (Minogue was only 36 years old when diagnosed) and those who had never had a mammogram. Similarly, news coverage of actress Angelina Jolie's decision to have genetic testing for a BRCA1 mutation and subsequent prophylactic double mastectomy was linked to a dramatic increase in requests for breast cancer-related genetic testing (Evans et al., 2014). In addition to providing evidence of the effects of news coverage of breast cancer-related topics on screening behavior, these studies hint at the powerful effects of personal stories in the news on news consumers.

General Effects of News Commentary

Though the research described above provides insight into the ways in which news coverage of breast cancer and mammography related issues affect news consumers, it does not provide a comprehensive understanding of the effects of news. Online news stories are often presented together with user-generated comments (Lee, 2012; Weber, 2014), which have been shown to modify the effects of news article on readers. The body of research outlined below attempts to explain the effects of varying comment characteristics, such as valence and civility, on individuals' attitudes, perceptions of public opinion and social norms, and perceptions of risk.

First, comments on online news articles have been shown to have effects on readers' attitudes and positive and negative thoughts about the topic in the news article. In an online experiment, Lee (2014) tested the effects of argument strength (strong vs. weak) on attitude toward the subject of the news article (graduation qualification exams) and positive and negative thoughts about the topic provided in a thought-listing exercise.

Lee found that comments with strong arguments were likely to produce more positive thoughts and marginally more favorable attitudes than comments with weak arguments, and weak arguments in the comments led to more negative thoughts reported. Hsueh, Yogeeswaran, and Malinen (2015) also examined the effect of comments on attitudes using an online experiment that manipulated whether comments on an article about scholarships for Asian students were prejudiced or unprejudiced toward Asian students. They found that participants in the prejudiced comment condition had less positive attitudes toward Asians than participants in the unprejudiced comments condition across multiple measures of attitude. These changes in attitude also appeared to translate into subtle changes in behavior—participants had a chance to leave their own comments, and those who had been exposed to prejudiced comments left comments that were judged to be more prejudiced than were comments left by participants in the unprejudiced condition.

Though Hsueh et al. (2015) did not measure perceived norms, they argue that comments can be used to convey a social norm, which then influences attitudes and behavior. Indeed, further research on the effects of user-generated comments responding to online news articles has demonstrated that comments affect perceived norms and perceptions of the opinion climate surrounding a particular topic. In an online experiment, Lee and Jang (2010) found that the presence of user-generated comments following an online news story had a significant effect on participants' perceptions of public opinion about the two issues addressed in the news articles (animal testing and regulation of television content). Perhaps unsurprisingly, participants who read

comments discrepant with the slant of the news article perceived public opinion to be more discrepant with the tone of the article than did participants who saw no user-generated comments following the story. This effect was especially pronounced for participants high in need for cognition (NFC), who may have attended to the comments more carefully than those with lower NFC, suggesting NFC as a potential moderator of the effect of comments on readers. Similarly, Lee (2012) conducted an online experiment in which participants read a news article with comments that were either congruent or incongruent with their opinion, which was measured before the experiment. Again, readers used comments to gauge public opinion on the issue; participants who read comments that were consistent with their opinion saw the public as being on their side, while those who saw comments that were inconsistent with their opinion perceived the public to be on the opposite side of the debate. Perhaps more interestingly, comments enhanced perceptions of media bias for some participants. For participants with a high level of ego involvement, comments congenial with their opinion made the actual news story appear more congenial, while comments hostile to their position led to perceptions that the news story was biased against their position.

In addition to effects of comments on attitudes and perception of public opinion, at least one study has shown that user-generated comments on news articles can affect risk perceptions. Anderson et al. (2014) conducted an online experiment in which they manipulated the civility of comments on an online news blog post about nanotechnology. Because incivility in comments has been linked to negative affect and negative attitudes, Anderson et al. expected that incivility would also be associated with increased risk

perceptions. While this main effect was not present, findings revealed an interaction between civility of comments and pre-existing levels of support for nanotechnology. For those who had low levels of support for nanotechnology prior to the experiment, uncivil comments led to higher risk perceptions of nanotechnology than for those who had high pre-existing levels of support and also saw uncivil comments. Though this study examines comments on science news, findings may translate to the health news domain.

Each of the studies mentioned above provides evidence that comments affect readers, but prior research is limited in the outcomes and comment characteristics examined. Particularly, research on behavioral outcomes and risk perceptions is rare, with Hsueh et al. (2015) being one of the only to examine behavioral outcomes and Anderson et al. (2014) being one of the few to examine risk perceptions. Further, the comment characteristics examined are mostly limited to valence and civility. Despite the fact that much is known about the persuasive effects of narratives and exemplars in the domain of health communication (see Green, 2006, and Zillmann, 2006, respectively), prior studies on the effects of narratives or exemplars in online news article comments are almost nonexistent. As mentioned previously, only one study has examined the effects of story-oriented online news comments on readers (Witteman, Fagerlin, Exe, & Zikmund-Fisher, 2013), and this study remains unpublished. Witteman et al. performed an online experiment that presented a news article on the topic of home birth, followed by either no comments or comments that varied according to a 2 (comment valence: positive vs. negative) x 2 (comment type: fact-oriented vs. story-oriented) between-subjects factorial design. They measured opinion toward home birth and likelihood of planning a home

birth and recommending it to others. Valence of comments affected opinion in the expected direction; more favorable comments led to more positive opinions. Witteman et al. demonstrated that this effect was moderated by the presence of narrativity, such that narrative comments enhanced the effects of valence. Though these studies provide some insights, further research is needed to determine the effect of user-generated comments that include exemplars on readers' risk perceptions and behaviors, especially when comments deal with controversial health topics and could have an influence on consequential health behaviors such as breast cancer screening.

Theoretical Background and Hypotheses

Effect of Exemplars on Behavioral Intentions

The literature in this area provides reason to believe that individual experiences shared in comments on news articles can have an effect on behavioral intentions. First, I proposed that different types of exemplars would affect behavioral intentions differentially, essentially pushing intentions in different directions, due to different valence. The predicted effects of valence are straightforward: the majority of comments that include an exemplar in which the mammogram detects cancer (hereafter referred to as “mammogram-detected cancer exemplars”) are pro-mammogram and are expected to have a positive effect on mammography intentions, while the majority of comments that include false-positive exemplars are more cautious toward mammograms and are expected to have negative effects on mammography intentions. This is summarized in the following hypotheses:

H1a: Comments with mammogram-detected cancer exemplars, when compared to comments with false-positive exemplars, will lead to increased intentions to have a mammogram in the next two years

H1b: Comments with mammogram-detected cancer exemplars, when compared to comments with false-positive exemplars, will lead to decreased intentions to wait until age 50 to begin screening.

However, I also predicted that comments with exemplars would lead to greater changes in intentions than comments without exemplars. In the case of Witteman et al. (2013), part of the effect of comments on outcomes was driven by valence, but the effects of valence were made stronger by the presence of narrativity. In addition to the work by Witteman et al., a large body of research suggests that narrative information can have a greater effect on behavioral intentions than can non-narrative information. For example, a meta-analysis by Zebregs, van den Putte, Neijens, and de Graaf (2015) suggests that narrative evidence has a stronger influence on behavioral intentions than statistical evidence. Based on this research, I proposed that comments that included mammography exemplars would lead to greater changes in mammography intention than comments without exemplars—regardless of the direction of the change—such that the following would be true:

H2a: Comments with mammogram-detected cancer exemplars will lead to higher intentions to have a mammogram in the next two years and lower intentions to wait until age 50 when compared to mammogram-detected cancer comments without exemplars.

H2b: Comments with false-positive exemplars will lead to lower intentions to have a mammogram in the next two years and higher intentions to wait until age 50 when compared to false-positive comments without exemplars.

A synthesis of how exemplars can be used to promote health outlines some of the mechanisms of action through which exemplars may have effects on health behaviors (Zillmann, 2006). Mechanisms through which exemplars and narratives may affect health behaviors and predictors of health behaviors include the following: creating transportation into a text, which has been shown to increase behavioral intentions and may also lead to attitude change through decreased counter-arguing; shifting perceived norms; and providing models for behavior change, which has been shown to increase self-efficacy for behavior change. The Integrative Model (Fishbein, 2000; Fishbein & Ajzen, 2010) proposes that attitudes, perceived norms, and self-efficacy are direct predictors of behavioral intention, providing multiple pathways through which comments with mammography exemplars may have an effect on mammography intentions.

Green (2006) offers multiple theoretical mechanisms through which transporting narratives may be particularly persuasive in a cancer-related communication context, including through effects on attitudes, norms, and self-efficacy. Given the many possible pathways of effect, one would expect that greater transportation would lead to greater changes in behavior intentions. In fact, Kim, Bigman, Leader, Lerman, and Cappella (2012) found this to be the case. In an online experiment, the presence of exemplars in news stories increased reader engagement (a combination of narrative transportation, perceived similarity, and empathy). They found that engagement mediated the

relationship between the presence of exemplars and intentions to quit smoking, such that increased engagement led to greater increases in behavioral intentions. I expect the same to be true of exemplars present in user-generated comments:

H3: Effects of comments with mammography exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by narrative transportation.

Additionally, Green (2006) describes two primary ways in which narratives may affect attitudes: through changes in affectively-based attitudes and in cognitively-based attitudes. In the particular case of “mammogram-detected cancer exemplars,” these mammography narratives may result in affective shifts that create positive attitudes toward mammography (e.g., relief that an exemplar’s cancer was caught early may translate to increases in the perceived utility of mammograms and a desire to obtain one for peace of mind). Additionally, because narratives have been shown to decrease counter-arguing, mammogram-detected cancer exemplars may also change cognitively-based attitudes about mammography by decreasing counter-arguing about the possibility of experiencing risks associated with mammography. Similarly, I expected that false-positive exemplars would increase negative affect toward mammograms by highlighting the anxiety and suffering of exemplars who experienced unnecessary additional testing and lead to more negative affectively-based attitudes toward mammograms. False-positive exemplars may also decrease counter-arguing about the benefits of mammography, resulting in more negative cognitively-based attitudes toward

mammography. Based on expected effects on intentions through attitudes, I proposed the following:

H4: The effects of comments with exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by attitudes toward mammography.

Another possible mechanism through which exemplars in comments may affect behavioral intentions is through comments' effects on perceived social norms.

Individuals are motivated to observe norms (in this case, through reading about others' experiences) so that they can hold accurate beliefs and gain social acceptance (Cialdini & Goldstein, 2004). Hinyard and Kreuter (2007) propose that shared personal experience narratives can shape perceived social norms related to a health behavior and that this is particularly true when message recipients identify with the person sharing the personal story. Further, in the domain of user-generated comments research, comments have been hypothesized to establish social norms that influence the attitudes and behaviors of comment readers (Hsueh, Yogeewaran, & Malinen, 2015). Taken together, this suggests that comments in which authors share personal mammography experiences will influence readers' perceived social norms related to mammography screening behavior as follows:

H5: Effects of comments with mammography exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by perceived mammography norms.

Finally, comments with exemplars may change behavioral intentions by providing models for behavior change. Green (2006) explains that characters in narratives can model the “costs and benefits of different courses of action” (p. S166), providing the reader with vicarious experience. According to Social Cognitive Theory (Bandura, 1977; Bandura, 1986), vicarious experience obtained by observing others can increase self-efficacy for a particular behavior. This suggests that comments containing mammography exemplars, and thus models of women who have obtained mammograms, can increase self-efficacy to obtain a mammogram and mammography intentions:

H6: Effects of comments with mammogram-detected cancer exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by self-efficacy to obtain a mammogram.

Effect of Exemplars on Risk Perceptions

Exemplars in comments on mammography news articles may also have effects on risk perceptions. Zillmann (2006) discusses two heuristics that explain why exemplars may shape beliefs about perceived health risks: the quantification heuristic and the availability heuristic. The quantification heuristic predicts that readers who encounter exemplars will use the distribution of exemplar outcomes to estimate the actual distribution of that outcome in the population. This heuristic suggests that readers who see multiple mammogram-detected cancer exemplars will believe that this outcome is more likely than a false-positive outcome, and that the reverse would also be true. Tversky and Kahneman’s (1982) availability heuristic predicts that people will make

judgments based on the exemplars that are most salient at the time of the judgment. Therefore, frequent and recent exposure to exemplars with a mammogram-detected cancer or false positive may heighten a reader's perceived risk for that outcome by influencing the ease with which readers can retrieve examples of women who have experienced these mammography outcomes. Given the mechanisms outlined by Zillmann, I predicted that the presence of exemplars in comments would increase perceived risk for breast cancer, positive mammograms, and false-positive mammogram results in the following ways:

H7a: The presence of comments with mammogram-detected cancer exemplars will be associated with increased perceived breast cancer risk when compared to the presence of mammogram-detected cancer comments without exemplars (i.e., nonexemplar comments of the same valence and topic).

H7b: The presence of comments with mammogram-detected cancer exemplars will be associated with increased perceived risk of a positive mammogram when compared to the presence of mammogram-detected cancer comments without exemplars (i.e., nonexemplar comments of the same valence and topic).

H7c: The presence of comments with false-positive exemplars will increase perceived risk of experiencing a false-positive when compared to the presence of false-positive comments without exemplars (i.e. nonexemplar comments of the same valence and topic).

In addition to working via the heuristics mentioned above, comments with exemplars may also shape risk perceptions through their effects on affect—negative affect, in particular. As discussed earlier in this chapter, most exemplar comments can be considered narratives or testimonials, and one of the recognized advantages of using narratives for cancer communication is the ability of narratives to evoke emotion (Green, 2006). Indeed, breast cancer narratives have been shown to bring about more emotion, both negative and positive, than non-narrative information (McQueen & Kreuter, 2010). Research has also shown a relationship between negative affect and risk. For example, Johnson and Tversky (1983) proposed that bad moods induced by having participants read brief newspaper stories increased general risk perceptions. In the cancer domain, worry has been linked to breast cancer risk perceptions (Lipkus et al., 2000).

Dunlop, Wakefield, and Kashima (2008) outline a theory of the effect of narratives on risk through the mechanism of negative emotion. In particular, Dunlop et al. argue that testimonial messages arouse negative self-referent emotions, which are particularly effective in changing perceptions of personal susceptibility to a disease. A study in the breast cancer realm provides further support for negative affect as a mediator; McQueen, Kreuter, Kalesan, and Alcaraz (2011) demonstrate that the effect of breast cancer survivor stories on increased risk perceptions was mediated by negative affect. Based on the expected role of negative affect as a mediator of the relationship between exemplars and risk perception, I propose the following hypotheses:

**H8a: The effects of mammogram-detected breast cancer exemplars
(compared to comments that are of the same valence and topic but lack**

exemplars) on perceived risk of breast cancer will be mediated by changes in negative affect.

H8b: The effects of mammogram-detected breast cancer exemplars (compared to comments that are of the same valence and topic but lack exemplars) on perceived risk of having a positive mammogram will be mediated by changes in negative affect.

H8c: The effects of false-positive mammogram exemplars (compared to comments that are of the same valence and topic but lack exemplars) on perceived risk of having a false-positive mammogram will be mediated by changes in negative affect.

Exemplars, Risk Perceptions, and Intentions

In addition to viewing risk perception as an outcome affected by exemplars, I wanted to examine it as a potential mediator of the effect of exemplars on mammography intentions. As outlined above, compared to comments without exemplars, comments with exemplars are expected to increase perceived risk of breast cancer, positive mammograms, and false-positive mammograms, depending on the type of exemplar presented. These changes in perceived risk are then expected to alter mammography intentions.

Some theories of behavior change or behavioral prediction acknowledge the role of perceived risk in predicting health behaviors. The Health Belief Model (Becker, 1974; Rosenstock, 1974) includes perceived susceptibility and perceived severity as essential components preceding desirable health behaviors. The Reasoned Action Model (Fishbein

& Ajzen, 2010) proposes that risk perception is a more distal predictor of behavior, having its effect on intention through effects on attitudes, norms, and perceived behavioral control. Additional research demonstrates the link between risk perception and health behavior in a number of contexts, including vaccination (Brewer et al., 2007) and mammography (Katapodi, Lee, Facione, & Dodd, 2004).

To the author's knowledge, there are no studies demonstrating that an effect of narratives or exemplars on mammography is mediated by risk perceptions, but there are several instances in the literature in which risk perceptions have been found to mediate the relationship between the presence of exemplars and other behavioral intentions. Prior research shows that narratives about adverse vaccine events led to increased perceived risk of experiencing an adverse event (Betsch, Ulshofer, Renkewitz, & Betsch, 2011), which then led to decreased vaccination intentions. Similarly, when compared to statistical evidence, the use of personal testimonials increased perceived risk of contracting the hepatitis B virus and intentions to get vaccinated, and the effect of testimonials on intention was mediated by risk perceptions (de Wit, Das, & Vet, 2008). Thus, in addition to the mediators of the exemplar–intention relationship I proposed in Hypotheses 3 through 6, I also predicted the following:

H9: The effects of exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by risk perceptions.

These hypotheses outline the ways in which mammography exemplars found in user-generated comments on online news articles were expected to have effects on both

mammography intentions and risk perceptions related to breast cancer and mammography. This research tested these effects and proposed mechanisms by using an experimental design that manipulated the presence and type of exemplars in user-generated comments and measured changes in the outcome variables and proposed mediators.

CHAPTER 4

THE EFFECTS OF MAMMOGRAPHY EXEMPLARS IN ONLINE NEWS COMMENTARY ON BREAST CANCER RISK PERCEPTIONS AND SCREENING INTENTIONS: METHODOLOGY

Study 2 consisted of an experiment examining the effects of different types of comments on intentions, risk perceptions, and potential mediators. The following section outlines the experimental methodology.

Experimental Methodology

The main experiment assessed the effect of comments with exemplars, specifically false-positive mammogram exemplars and mammogram-detected cancer exemplars, on mammography intentions, breast cancer risk perceptions, positive mammogram risk perceptions, and false-positive mammogram risk perceptions. Because Study 1 demonstrated that a large majority of comments with false-positive exemplars were cautious toward mammography, only false-positive exemplars with this valence were tested. Similarly, because comments with mammogram-detected cancer exemplars were almost exclusively enthusiastic toward mammography, only mammogram-detected cancer exemplars of this valence were included in Study 2.

Participants

This research received approval from the Institutional Review Board at the University of Pennsylvania. I purchased from Survey Sampling International (SSI) access to a sample of women in the United States between the ages of 38 and 48 ($N = 1,108$). Potential participants received an email invitation from SSI with a link to the

online study and received compensation from SSI for their time. SSI compensates participants with points that can be redeemed for cash or other rewards.

Participant characteristics by condition are presented in Table 4.1. The average age of participants was 42.8 years. Participants were more well-educated than the general population when compared to U.S. Census estimates of people 35 to 54 years old (U.S. Census Bureau, 2014a): 38.6% of participants had at least some college or technical school education (compared to 27.2% of the general population), and 39.8% had a college degree or higher educational attainment (compared to 33.9% of the general population). The sample was ethnically and racially diverse and similar to the ethnic and racial composition of U.S. women ages 38 to 48, with 7.4% of women identifying themselves as being of Hispanic, Latina, or Spanish origin (vs. 12.3% in the U.S. population); 85.6% identifying as White (vs. 81.1%); 10.0% identifying as Black or African American (vs. 12.5%); 2.9% identifying as American Indian or Alaska Native (vs. 1.6%); 3.1% identifying as Asian (vs. 5.9%); and 1.0% identifying as Native Hawaiian or Other Pacific Islander (vs. 0.3%; population figures derived from U.S. Census Bureau, 2014b). Roughly 15% of participants reported a family history of breast cancer, and 64% reported having had a prior mammogram. Chi-square analyses did not show significant differences across condition for any of these characteristics.

Table 4.1

Participant Characteristics

	Condition								Total
	NoInfo	No Comm	FPNoEx	BCNoEx	FPEX	BCEX	FPEX Rem	BCEXRem	
<i>n</i>	156	140	160	116	133	143	128	132	1,108
Participant age, <i>M (SD)</i>	43.0 (3.3)	42.9 (3.1)	42.6 (3.4)	42.6 (3.1)	42.8 (2.9)	43.0 (3.2)	42.8 (3.0)	42.6 (3.1)	42.8 (3.1)
Education, %:									
Less than high school	3.2	2.9	1.3	2.6	0.8	2.8	2.3	2.3	2.3
High school graduate or GED	21.8	20.0	16.9	24.1	21.8	14.0	16.4	20.5	19.3
Some college or technical school	35.9	37.9	37.5	30.2	39.1	47.6	42.2	37.9	38.6
College graduate or beyond	39.1	39.3	44.4	43.1	38.4	35.7	39.1	39.4	39.8
Ethnicity:									
Hispanic, Latino/a, Spanish origin, %	5.8	3.6	10.0	8.6	7.5	7.0	9.4	7.6	7.4
Race, %: ^a									

White	82.7	87.9	86.3	81.0	89.5	87.4	87.5	81.8	85.6
Black or African American	14.7	10.0	11.3	12.9	6.0	9.1	6.3	9.1	10.0
American Indian or Alaska Native	4.5	3.6	1.9	2.6	1.5	3.5	2.3	3.0	2.9
Asian	0.0	2.1	2.5	4.3	3.0	3.5	4.7	5.3	3.1
Native Hawaiian or Other Pacific Islander	1.3	1.4	0.0	0.0	0.8	0.0	3.1	1.5	1.0
Family history of breast cancer, %	13.5	10.8	17.5	16.4	15.8	12.6	15.6	16.7	14.8
Have had at least one mammogram, %	64.7	59.0	68.1	67.2	65.4	66.4	64.8	59.1	64.4
Comment reading time \geq half the median	N/A	N/A	63.1	59.5	62.4	67.1	62.5	63.4	63.2
Used mobile device to respond to survey	52.6	58.6	52.5	43.1	57.9	52.5	56.3	53.0	53.4

Note. $N = 1,108$. Conditions are as follows: NoInfo = no information control, NoComm = no comments control, FPNoEx = false-positive comments without exemplars, BCNoEx = mammogram-detected breast cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected breast cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected breast cancer comments with exemplars removed. Drop-out rates did not vary by condition, and chi-square tests showed no significant difference across conditions for any of these participant characteristics.

^a Participants were allowed to choose multiple races, so percentages may not add to 100.

Sample power

Because communication interventions typically lead to small effects (Snyder & Hamilton, 2002), this study was powered to detect small- to medium-sized differences between conditions. According to Cohen (1992), a standardized mean difference of .20 is considered a small effect size, and .50 is considered a medium effect size. Power calculations showed that a sample size of 130 participants per condition would provide 80% power to detect a standardized mean difference of .35.

Measures

The full questionnaire is available in Appendix C. Participants were first asked their sex, age, personal breast cancer history, and whether they had tested positive for a BRCA1 or BRCA2 genetic mutation to determine eligibility. Only women between the ages of 38 and 48 who had no history of breast cancer and no known genetic mutation (and thus an average risk of breast cancer) were allowed to continue. Eligible participants then answered items regarding family breast cancer history and mammography history before being assigned to experimental condition. The post-test consisted of measures of the primary dependent variables (mammography intentions and risk perceptions), proposed mediators of the relationship between exposure to mammography exemplars and the dependent variables, demographic variables, and variables needed to calculate objective breast cancer risk using the Gail model (Gail & Costantino, 2001).

Mammography intentions. Mammography intentions were measured using two items: “I intend to have a mammogram in the next two years,” and “I intend to wait until

age 50 to have a mammogram.” Participants rated their level of agreement on a seven-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). The distribution of intentions to have a mammogram in the next two years was left-skewed (skewness = -1.13) and slightly peaked (kurtosis = 3.05). The distribution of intentions to wait until age 50 to have a mammogram was right-skewed (skewness = 1.18) and slightly peaked (kurtosis = 3.34). These two intention measures were negatively correlated ($r = -.47, p < .001$).

Perceived risk of breast cancer. The survey measured perceived breast cancer risk in four different ways using modified versions of measures reported by Schapira, Davids, McAuliffe, and Nattinger (2004): five-year risk as a frequency, lifetime risk as a frequency, five-year risk as a percentage, and lifetime risk as a percentage. Schapira et al. demonstrated that risk perceptions varied when measured in different ways, so using these four measures allowed me to examine how the effect of exemplars may differentially affect types of risk perceptions. Five-year risk as a frequency was measured using the following item: “Picture yourself in a room with 99 other women exactly like you. How many of you will get breast cancer in the next five years? Please pick any number between 0 and 100.” The measure of lifetime risk as a frequency posed the same question, but asked participants “How many of you will get breast cancer in your lifetime?” Five-year breast cancer risk as a percentage was measured using the following item: “What do you think your personal risk or chance is of getting breast cancer in the next five years? Please answer on a scale of 0% to 100%. For example, 0% means ‘no risk or chance of getting breast cancer’ and 100% means ‘completely certain

to get breast cancer.” Lifetimes risk as a percentage was measured in a similar way, substituting the phrase “in your lifetime” for “in the next five years.” All four measures of breast cancer risk were right-skewed (skewness ranged from 0.59 to 1.15) and slightly kurtotic (kurtosis ranged from 2.78 to 3.70). Correlations among measures of perceived risk of having breast cancer are reported in Table 4.2. Perceptions vary widely based on how risk is measured (Schapira, Davids, McAuliffe, and Nattinger, 2004; Gurmankin Levy, Shea, Williams, Quistberg, & Armstrong, 2006), so these four measures were not combined into a scale but rather used individually as dependent variables. Using these measures individually is consistent with how similar measures are used in the breast cancer literature (e.g., Gibbons & Groarke, 2015).⁶

Table 4.2

Correlations among Measures of Breast Cancer Risk

	Five-year risk, frequency	Lifetime risk, frequency	Five-year risk, percentage	Lifetime risk, percentage
Five-year risk, frequency	1.00			
Lifetime risk, frequency	0.74***	1.00		
Five-year risk, percentage	0.57***	0.56***	1.00	
Lifetime risk, percentage	0.50***	0.57***	0.86***	1.00

***p<.001

⁶ Results presented in Chapter 6 demonstrate that the conclusions drawn from this data do not change, even if measures are combined into a scale (see footnote 13).

Perceived risk of positive mammogram. I also adapted the items from Schapira et al. (2004) to measure perceived risk of having a mammogram-detected breast cancer and risk of having a false-positive mammogram result as a frequency and as a percentage. To measure the risk of having a positive mammogram, participants were asked to “Picture yourself in a room with 99 other women exactly like you. If you all had a mammogram today, how many of you would have a mammogram that finds cancer?” Answers were recorded on a sliding scale that ranged from 0 to 100. They were then asked, “If you had a mammogram today, what do you think your personal risk or chance is of having a mammogram that finds cancer?” The sliding scale ranged from 0% to 100%, where 0% meant *no risk or chance of having a mammogram that finds cancer* and 100% meant *completely certain to have a mammogram that finds cancer*. These two measures were significantly correlated ($r = .70, p < .001$).

Perceived risk of having a false-positive mammogram result. Before answering items regarding the risk of having a false-positive mammogram result, participants first read the definition of a false-positive: “A ‘false positive’ happens when a woman has a mammogram that leads to more screening, tests, or biopsies but then finds out she does not have breast cancer.” Following the structure of risk items developed by Schapira et al. (2004), participants were asked to “Picture yourself in a room with 99 women exactly like you. If all of you have a mammogram in the next two years, how many of you will have a false positive (the need for extra testing that later shows you don’t have cancer)?” Answers were recorded on a sliding scale from 0 to 100. The percentage item read “If you have a mammogram in the next two years, what do you

think your personal risk or chance is of having a false positive (the need for extra testing that later shows you don't have cancer)?" Participants were instructed to answer on a scale from 0% to 100% where 0% means *no risk or chance of having a false positive* and 100% means *completely certain to have a false positive*. These two measures were significantly correlated ($r = .78, p < .001$).

Narrative transportation. Proposed mediators of the effect of exemplars on intention included transportation, perceived mammography norms, self-efficacy to obtain a mammogram, and attitudes toward mammography. Narrative transportation was measured using a subset of the original transportation scale developed by Green and Brock (2000), adapted for this experimental context and, in one case, to remove the need for reverse-coding. These items included "I was mentally involved in the comments while reading them," "The comments affected me emotionally," "The comments are relevant to my everyday life," and "After finishing the comments, I found it hard to put them out of my mind." These four items capture major dimensions of cognitive attention and emotional involvement and were scored on a seven point scale from 1 (*not at all*) to 7 (*very much*). The original 15-item scale had a Cronbach's alpha of .76. Subsets of items have been used successfully by Kim, Bigman, Leader, Lerman, and Cappella (2012), and by Appel, Gnambs, Richter, and Green (2015) and have been shown to have adequate reliability. However, using factor-analysis, Kim et al. found that reverse-scored items in the transportation scale loaded on a separate factor from the other items in the scale, which may have been an artifact of their negative wording. Thus, I chose to adapt a reverse-scored item from the original Green and Brock scale to eliminate the need for

reverse-scoring (i.e., “I found it hard to put them out of my mind” instead of “I found it easy to put them out of my mind.”). Cronbach’s alpha for the scale in the present research was .83, and participant scores on the scale were approximately normally distributed (skewness = -0.17, kurtosis = 2.5).

Additional proposed mediators of the effect of exemplars on mammography intentions included behavioral predictors outlined by the Integrative Model (Fishbein, 2000): attitudes, perceived norms, and self-efficacy.

Attitude toward mammography. The survey measured participant attitudes toward “having a mammogram in the next two years” and “waiting until age 50 to have a mammogram.” These two attitudes were each measured using a set of three semantic differential items on a 7-point scale (*extremely/ quite/ slightly/ neutral/ slightly/ quite/ extremely*) with the following endpoints: useless/useful, harmful/harmless, bad/good. In prior research on mammography attitudes (Seitz et al., 2015), a scale composed of these three items had a Cronbach’s alpha of .87. The three items measuring attitude toward having a mammogram in the next two years had a Cronbach’s alpha of .89 in the present data. These three items were averaged to form a scale, which was left-skewed (skewness = -0.80) with a large peak at 7. The three items measuring attitude toward waiting until age 50 to have a mammogram had a Cronbach’s alpha of .90. The three items averaged to form a scale that was right-skewed (skewness = 0.36). Distribution was bimodal, with a large peak at 1 (extremely useless, harmful, or bad) and a second peak at 4 (neutral).

Perceived mammography norms. Perceived norms related to mammography were measured using items adapted from Fishbein and Ajzen (2009) to assess perceived descriptive and injunctive norms for both having a mammogram in the next two years and postponing a mammogram until age 50. Participants were asked to rate their level of agreement, on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*), with the following statements: “Most people who are important to me think I should have a mammogram in the next two years” (injunctive for having mammogram), “Most people who are important to me think I should wait until age 50 to have a mammogram” (injunctive for postponing mammogram), “Most women like me will have a mammogram in the next two years” (descriptive for having mammogram), and “Most women like me will wait until age 50 to have a mammogram” (descriptive for postponing mammogram). Measures of norms related to having a mammogram in the next two years were left-skewed (injunctive: skewness = -0.43; descriptive: skewness = -0.49). The pattern was reversed for norms related to waiting until age 50 to have a mammogram, with both measures being right-skewed (injunctive: skewness = 0.47; descriptive: skewness = 0.21). Kurtosis measures ranged from 2.71 to 2.39. Correlations among the four measures are reported in Table 4.3.

Table 4.3

Correlation among Measures of Mammography Norms

	Injunctive for having mammogram	Injunctive for postponing mammogram	Descriptive for having mammogram	Descriptive for postponing mammogram
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Injunctive for having mammogram	1.00			
Injunctive for postponing mammogram	-0.35***	1.00		
Descriptive for having mammogram	0.50***	-0.18***	1.00	
Descriptive for postponing mammogram	-0.26***	0.52***	-0.30***	1.00

*** $p < .001$

Self-efficacy to obtain a mammogram. Self-efficacy was measured using items and scales adapted from Bandura (2006). These two items asked participants to rate “how certain you are that you could have a mammogram in the next two years if you wanted to” and “how certain you are that you could wait until age 50 to have a mammogram if you wanted to” using a scale from 1 (*could not do at all*) to 11 (*highly certain I could*). Self-efficacy to have a mammogram in the next two years was left-skewed (skewness = -0.80) and kurtotic (kurtosis = 2.42). Overall distribution for self-efficacy to wait until age 50 to have a mammogram had peaks at 1, 6, and 11 (skewness = 0.28, kurtosis = 1.77).

Affect. Affect was measured using the 20-item Positive Affect Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) and five additional items taken from the expanded version of the PANAS, the PANAS-X (Watson & Clark, 1994). Together, these 25 items included a 10-item negative affect scale and a 10-item positive affect scale. The scales and additional items also allow for measurement of individual affective states, including fear, anger, guilt, sadness, joviality (happiness), self-assurance,

attentiveness, serenity, and surprise. Three additional affective items were added to the scale to allow for measurement of hope, pride, and worry. Negative affect was proposed to be the main mediator of effects of exemplars on risk perceptions. The negative affect scale averaged responses to the following emotions: afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset, and distressed. The scale had a Cronbach's alpha of 0.93 and was right-skewed (skewness = 1.26) and kurtotic (kurtosis = 4.06).

Demographic and breast cancer risk factors. Demographic variables, including ethnicity (of Hispanic, Latino, or Spanish origin/not of Hispanic, Latino, or Spanish origin), race (White/Black or African American/American Indian or Alaska native/Asian/Native Hawaiian or other Pacific Islander), and education (less than high school/high school graduate or GED/some college or technical school/college graduate or beyond) were also recorded. In the analyses that appear in following chapters, education has been recoded so that it can be treated as a continuous variable (less than high school = 10 years, high school graduate or GED = 12 years, some college or technical school = 14 years, college graduate or beyond = 16 years). Participants also answered questions about breast cancer risk factors (identified by Gail & Costantino, 2001), including age at first live birth of a child, age of menarche, and history of breast biopsy.

Potential moderators. Although no moderators of effects of comments on mammography intentions or risk perceptions were hypothesized, the variables measured allow for the examination of potential moderating effects. Moderating variables of interest include those that might increase participants' ability or motivation to attend to the experimental manipulation, as ability and motivation have been shown to influence

processes of persuasive information (Elaboration Likelihood Model; Petty & Cacioppo, 1981, 1986a, 1986b). The primary variable in this research that captures participants' ability to process the messages is education level (described above). In this case, education also serves as a proxy for numeracy and health literacy, which are distinct from but highly correlated with education (see Baker, 2016 for more information about numeracy and health literacy). In my prior research, numeracy has served as an important moderator of effects of numeric risk-based interventions on accuracy of risk perceptions (Seitz et al., 2015). There are also variables that could affect participants' motivation to attend to messages. Because motivation increases with increasing message relevance (Briñol & Petty, 2006), variables affecting relevance may serve as moderators. Variables related to relevance include family history of breast cancer (recoded as a dichotomous variable: no family history/one or more first-degree relatives have had breast cancer) and having had at least one prior mammogram (dichotomous: yes/no). Among study participants, 14.8% had a family history of breast cancer, and 64.4% had had at least one prior mammogram. Summary statistics for each of these variables by condition are presented in Table 4.1.

I was also interested in variables that might affect the success of the intervention, such as time spent on the comment page (which was the main experimental manipulation) of the survey and whether or not participants accessed the survey using a mobile phone (because the small screen might make reading text more difficult). Because average reading time varied across comment conditions due to differing lengths of comments used, I created a dichotomous reading time variable to separate participants

who spent less than half of the median reading time for their condition on the comment page from those who spent at least half of the median reading time or higher on the comment page. I was also able to use survey metadata on the screen size of the device on which the participant viewed the survey to construct a dichotomous variable capturing whether or not the survey was taken on a mobile phone. In the study sample, 63.3% had a reading time that was at least half of the median reading time for their condition, and 53.4% completed the survey on a mobile phone. Summary statistics for each of these variables by condition are presented in Table 4.1.

Research Design

This research utilized Qualtrics, a web-based survey platform, to execute a between-subjects experimental design embedded within a survey. After giving informed consent, participants completed the screening items and measures of breast cancer and mammography history. Participants were then randomly assigned to one of the following conditions, shown in Table 4.4: 1) no information control (NoInfo), 2) no comments control (NoComm), 3) false-positive comments without exemplars (FPNoEx), 4) mammogram-detected breast cancer comments with no exemplars (BCNoEx), 5) false-positive comments with exemplars (FPEX), 6) mammogram-detected breast cancer comments with exemplars (BCEX), 7) false positive comments with exemplars removed (FPEXRem), or 8) mammogram-detected breast cancer comments with exemplars removed (BCEXRem). In the NoInfo condition, participants moved directly to the post-test. In the NoComm condition, participants viewed a balanced composite news story about mammography before completing the post-test. In the remaining conditions,

participants viewed the same balanced news story followed by a series of four reader comments (varying by condition) before completing the post-test. The post-test included measures of mammography intentions, perceived breast cancer risk, perceived risk of having a false-positive mammogram result, and perceived risk of having a positive mammogram, followed by measures of the proposed mediators, demographic variables and breast cancer risk factors, and an opportunity for open-ended feedback. Participants were fully debriefed after completing the survey.

Table 4.4

Experimental Conditions

Controls		User-generated nonexemplar comments		User-generated exemplar comments		Artificially created/edited nonexemplar comments	
NoInfo: No info control (no article, no comments)	NoComm: No control (article, no comments)	FPNoEx: Article + 3 user- generated <u>false-positive</u> comments <u>without</u> exemplars + 1 neutral comment	BCNoEx: Article + 3 user- generated <u>mammo-</u> <u>detected</u> <u>cancer</u> comments <u>without</u> exemplars + 1 neutral comment	FPEX: Article + 3 user- generated <u>false-positive</u> comments <u>with</u> exemplars + 1 neutral comment	BCEX:: Article + 3 user- generated <u>mammo-</u> <u>detected</u> <u>cancer</u> comments <u>with</u> exemplars + 1 neutral comment	FPEXRem: Article + 3 <u>false-positive</u> comments (from FPEX) <u>rewritten to</u> <u>remove</u> <u>exemplars</u> but preserve content +1 neutral comment	BCEXRem: Article + 3 <u>mammo-</u> <u>detected</u> <u>cancer</u> comments (from BCEX) <u>rewritten to</u> <u>remove</u> <u>exemplars</u> but preserve content + 1 neutral comment

Note. In conditions with comments, the neutral comments were pulled from a single pool of neutral user-generated comments about mammography that did not contain exemplars and were only minimally edited.

Experimental manipulation. The article and comments used for the study were taken from materials gathered in Study 1, which included mammography articles and associated reader comments published on NYTimes.com from November 2009 through December 2014. The article used was an edited version of an article on the revised USPSTF guidelines that was published in the *New York Times* in November 2009. The original article was altered to neutralize the title, reduce the overall length, balance the length of arguments for and against beginning mammograms at 50, remove quotations and exemplars, and update the guidelines to reflect recommendations at the time of the experiment (see stimulus article in Appendix D). The arguments for beginning mammograms at age 50 included minimizing the risks of false positives and overdiagnosis (137 words), and the arguments against waiting until age 50 included benefits of early detection and reduction in cancer deaths (136 words).

The comments used as experimental stimuli were also drawn from the content analysis and were minimally edited only when editing was needed to remove formatting, a reference to another commenter, a reference to something in the original article that was not present in the stimulus article, or, for the FPEXRem and BCEXRem conditions, to remove exemplars. Prior to the experiment, I constructed 20 sets of randomly selected and randomly ordered comments for each condition with comments (a sample set of comments for each condition is presented in Appendix D and the full comment pools are available in Appendix E). To construct sets of comments with the content and valence needed for each condition, as outlined in Table 4.1, comments were randomly drawn from seven pools of comments with 15 comments in each pool: neutral comments with

no exemplars, user-generated false positive comments without exemplars, user-generated mammogram-detected cancer comments without exemplars, user-generated false positive comments with exemplars, user-generated mammogram-detected cancer comments with exemplars, false positive comments that were rewritten to remove exemplars but preserve content, length, and reading level, and mammogram-detected cancer comments that were rewritten to remove exemplars but preserve content, length, and reading level. The inclusion of neutral comments in conditions with comments was designed to help mask the purpose of the study, while the use of random sampling from large pools of comments was designed to minimize case-category confounding and provide built-in experimental replication (as recommended by O’Keefe, 2015).

The experimental design employs two different ways of operationalizing nonexemplar comments. Including user-generated comments that did not originally include individual case examples in the FPNoEx and BCNoEx conditions helps increase the ecological validity of the experiment by providing a means of generalizing findings to currently existing nonexemplar comments. However, these comments differ from exemplar comments in the information they contain (despite attempts to select comments that are generally about false positives and mammogram-detected breast cancer). They may also differ from exemplar comments in other ways that are not experimentally controlled. To provide nonexemplar comparison conditions that convey the same information as the exemplar conditions, the FPExRem and BCExRem conditions use comments from the FPEx and BCEx conditions, respectively, that have been edited to remove references to exemplars. References to individual exemplars were replaced with

phrases such as “some women.” Across all of these conditions, efforts were made to construct sets of comments that were similar in length, reading level, and content.

Analysis

Descriptive statistics were used to examine demographic characteristics, breast cancer history, and mammography history across conditions. The effects of condition on risk perception and mammography intentions were examined using Ordinary Least Squares (OLS) regression. Moderating effects were examined using factorial analysis of variance (ANOVA) and OLS regression. When needed to compare sets of conditions or individual conditions, Wald tests were used following the regression analyses. The mediation hypotheses were tested using OLS regression with bootstrapping to create a bias-corrected 95% confidence interval for indirect effects.

CHAPTER 5
THE EFFECTS OF ONLINE NEWS COMMENTARY ON MAMMOGRAPHY
INTENTIONS

Introduction

This chapter presents the results from an online experiment to examine the effects of online news commentary on mammography intentions, including the effects of comments on intentions to have a mammogram in the next two years and intentions to wait until age 50 to have a mammogram. It also presents results of analyses investigating mechanisms of action underlying effects of comments on mammography intentions. Further detail about the hypotheses outlined below can be found in Chapter 3.

Hypotheses

Prior research on the effects of online commentary (Lee, 2012; Lee & Jang, 2010; Witteman, Fagerlin, Exe, & Zikmund-Fisher, 2013) suggests that the valence of comments will have an influence on outcomes; comments that are favorable toward the target behavior will produce more favorable outcomes, whether they are opinions, perceptions of public opinion, perceived message effectiveness, or intentions. Because the mammogram-detected cancer exemplar comments used in the study were all favorable toward mammography and comments with false-positive exemplars were all unfavorable toward mammography, I made the following predictions:

H1a: Comments with mammogram-detected cancer exemplars, when compared to comments with false-positive exemplars, will lead to increased intentions to have a mammogram in the next two years.

H1b: Comments with mammogram-detected cancer exemplars, when compared to comments with false-positive exemplars, will lead to decreased intentions to wait until age 50 to begin screening.

I also made predictions about the effects of the presence of exemplars in comments. Based primarily on research by Witteman et al. (2013) and Zebregs, van den Putte, Neijens, and de Graaf (2015) suggesting that narrative information has a stronger influence than non-narrative information, I predicted that comments with exemplars would lead to greater changes in intentions than comments without exemplars:

H2a: Comments with mammogram-detected cancer exemplars will lead to higher intentions to have a mammogram in the next two years and lower intentions to wait until age 50 when compared to mammogram-detected cancer comments without exemplars.

H2b: Comments with false-positive exemplars will lead to lower intentions to have a mammogram in the next two years and higher intentions to wait until age 50 when compared to false-positive comments without exemplars.

I proposed that exemplars would affect health behaviors and predictors of health behaviors by creating transportation into a text, which has been shown to increase behavioral intentions; changing attitudes; shifting perceived norms; and providing models, which has been shown to increase self-efficacy for behavior change. The latter three constructs—attitudes, norms, and self-efficacy—have been consistently shown to predict behavioral intentions as part of the Integrative Model (Fishbein, 2000; Fishbein & Ajzen, 2010).

First, exemplars were expected to create more narrative engagement and transportation than nonexemplar messages (Kim, Bigman, Leader, Lerman & Cappella, 2012). Green (2006) suggests that messages that produce greater transportation will have a stronger effect on behavioral intentions. This led to the following hypothesis:

H3: Effects of comments with mammography exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by narrative transportation.

The effects of exemplars on intentions were also expected to be mediated by a change in attitudes. Green (2006) proposed that narratives may create larger changes in affectively-based and cognitively-based attitudes than non-narrative information.

Therefore, I expected that exemplars would create changes in attitudes toward mammography that would then shape mammography intentions, based on predictions from the Integrative Model (Fishbein & Ajzen, 2010) and Reasoned Action Model (Fishbein & Ajzen, 2010):

H4: The effects of comments with exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by attitudes toward mammography.

I also proposed that exemplars may have effects on intentions through their effects on perceived norms. Hinyard and Kreuter (2007) highlight the potential of narrative to influence health behavior changes through its effects on shaping social norms, and Hsueh, Yogeewaran, and Malinen (2015) demonstrated that user-generated comments can influence perceived social norms. Norms are then expected to predict

behavioral intentions based on the Integrative Model (Fishbein & Ajzen, 2010) and Reasoned Action Model (Fishbein & Ajzen, 2010):

H5: Effects of comments with mammography exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by perceived mammography norms.

Exemplars were also expected to affect mammography intentions through their effects on self-efficacy. Narratives provide models of behavior change and vicarious experience for the reader (Green, 2006). Social Cognitive Theory (Bandura, 1977; Bandura, 1986) recognizes the role of behavioral modeling and vicarious experience in increasing self-efficacy, and self-efficacy is one of the key predictors of behavior change included in the Integrative Model (Fishbein & Ajzen, 2010). Because comments with mammogram-detected cancer exemplars provided models of women who had obtained mammograms, I expected the following:

H6: Effects of comments with mammogram-detected cancer exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by self-efficacy to obtain a mammogram.

Methods

This study used an experiment embedded in an online survey to examine the effects of mammography news commentary on readers. Participants were randomly assigned to one of eight conditions (see Table 4.1), with conditions varying on the

presence or type of comments displayed. These conditions are further described in Chapter 4.

Participants

Survey Sampling International recruited women in the United States between the ages of 38 and 48 years to participate in the study ($N = 1,108$) who had no history of breast cancer or genetic mutations related to breast cancer. Full participant characteristics are available in Chapter 4.

Measures

The focal dependent variables of interest in this chapter are intention to have a mammogram in the next two years and intention to wait until age 50 to have a mammogram. Measures are described in detail in Chapter 4 and the full questionnaire is available in Appendix C.

Research Design, Stimuli, and Procedure

See Chapter 4 for full details of the experimental design, procedure, and stimuli.

Analytic Approach

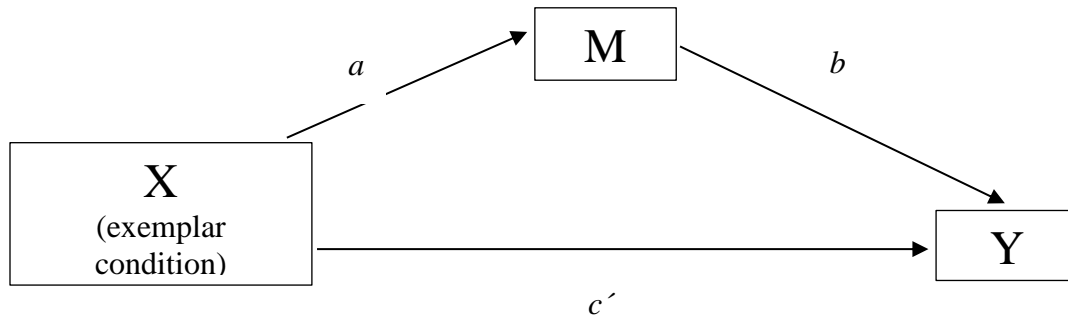
Main effects. To examine the effects of condition on each of the intention measures, I used Ordinary Least Squares (OLS) regression with the NoComm condition as the comparison condition. I then followed each regression with Wald tests to test individual hypotheses and to examine the main effects of presence of exemplars and valence/topic. To address Hypothesis 1a, I used *intentions to have a mammogram in the next two years* as the dependent variable and used Wald tests to compare FPEx and BCEx. Hypothesis 1b was tested similarly, using *intentions to wait until age 50 to have a*

mammogram as the dependent variable. Hypothesis 2a and 2b were tested in the same way: for H2a, Wald tests compared BCNoEx with BCEx and BCEx with BCExRem for both intention measures, and for H2b, Wald tests compared FPNoEx with FPEx and FPEx with FPExRem for both intention measures.

Moderation. I explored the moderating effects of participant education, family history of breast cancer, history of prior mammogram, survey reading time (dichotomous: less than one half of the mean reading time for respective condition vs. greater than or equal to one half of the mean time), and use of a mobile phone to answer the survey on the relationship between condition and mammography intentions using factorial ANOVA and OLS regression.

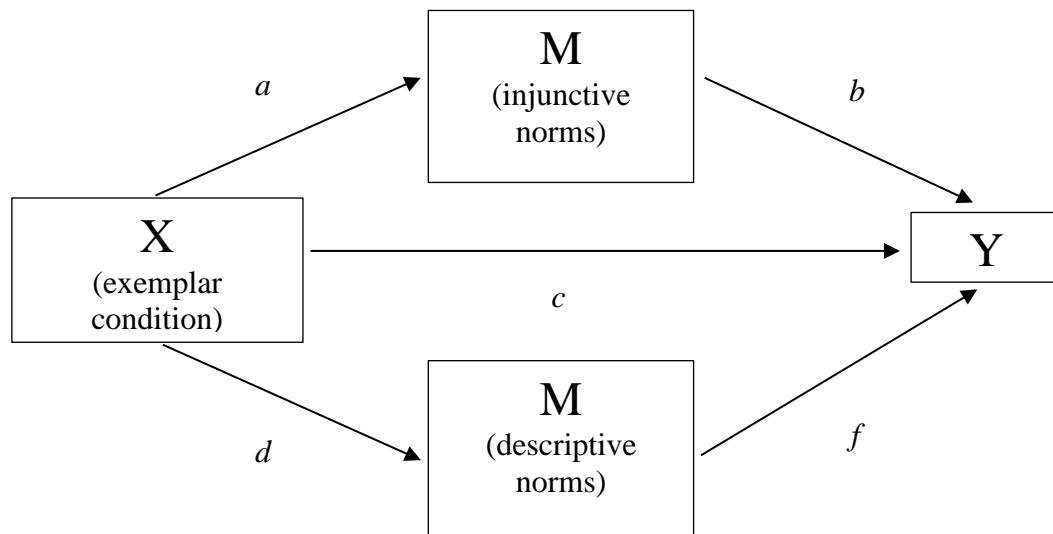
Mediation models. The mediation hypotheses tested in this chapter, Hypotheses 3, 4, 5, and 6, involved comparing an exemplar condition to a nonexemplar condition of the same topic and valence (i.e., FPEx vs. FPNoEx, FPEx vs. FPExRem, BCEx vs. BCNoEx, and BCEx vs. BCExRem. In each of these comparisons, a dummy variable was created for condition such that the condition with exemplars was coded as “1” and the nonexemplar condition was coded as “0.” Mediator and outcome variables were interval or ratio. Hypotheses 3, 4, and 6 involved testing a simple mediation model as illustrated in Figure 5.1. The mediator (M) and the dependent variable (Y) varied based on the hypothesis being tested. Because injunctive and descriptive norms were measured separately but both expected to mediate the effects of exemplars on intentions, Hypothesis 5 was tested using the parallel multiple mediation model shown in Figure 5.2. All models were tested using PROCESS for SPSS (Hayes, 2016) with SPSS version 22.

I used bootstrapping to create bias-corrected 95% confidence intervals for indirect effects



as recommended by Hayes (2009, 2013).

Figure 5.1. Simple mediation model. The effect of exemplars on the dependent variables of interest (either mammography intentions or risk perceptions, depending on the



hypothesis being tested) are proposed to be at least partially mediated (proposed mediators vary by hypothesis).

Figure 5.2. Parallel multiple mediator model. The effect of exemplars on the dependent variables of interest (either intentions to have a mammogram in the next two years or intentions to wait until age 50 to have a mammogram) are proposed to be at least partially mediated by injunctive norms and descriptive norms for each behavior.

Results

Study Flow

Of 3,800 potential participants invited, 1,527 began the survey. Two hundred and twelve were excluded because they did not meet eligibility criteria: 17 were male, 63 were outside of the study age range, 113 reported a history of breast cancer, and 19 reported having tested positive for a BRCA1 or BRCA2 genetic mutation. An additional 48 dropped out of the survey before being assigned to an experimental condition. The remaining 1,267 participants were randomly assigned to one of eight conditions: 169 to NoInfo (156 completed the survey), 157 to NoComm (140 completed), 180 to FPNoEx (160 completed), 140 to BCNoEx (116 completed), 154 to FPEx (133 completed), 160 to BCEx (143 completed), 153 to FPExRem (128 completed), and 154 to BCExRem (132 completed). The final number of participants was 1,108. There were no significant differences in drop-out rates across condition, $X^2(7, N = 1,267) = 10.2, p = .176$.

Mobile Phone Use

After data collection, I discovered that, despite being asked not to, approximately half of the participants completed the survey using mobile phones. As shown in Table 4.1, use of mobile phones to complete the survey did not vary across condition, $X^2(7, n = 1,108) = 8.14, p = .320$. Table 5.1 shows participant characteristics by mobile phone use.

Mobile use was significantly higher for participants with low levels of education, $X^2(3, n = 1,108) = 8.99, p = .029$, and significantly lower for participants who were Asian, $X^2(1, n = 1,108) = 4.64, p = .031$. Use of mobile phones was associated with a greater likelihood of having a reading time for the experimental manipulation that was less than half the median time for one's condition, $X^2(7, n = 1,108) = 8.99, p = .003$. Of 12 tests of the use of mobile phones to take the survey as a moderator of the effects of condition on intentions, none were significant.

Table 5.1

Participant Characteristics by Mobile Phone Use

	Did not use mobile phone	Used mobile phone	Total
Total %	46.6	53.4	100
Age, <i>M</i> (<i>SD</i>)	42.9 (3.1)	42.7 (3.2)	42.8 (3.1)
Education, %: ^a			
Less than high school	1.4	3.0	2.3
High school graduate or GED	17.4	21.0	19.3
Some college or technical school	37.6	39.5	38.6
College graduate or beyond	43.6	36.5	39.8
Ethnicity:			
Hispanic, Latino/a, Spanish origin, %	6.4	8.3	7.4
Race, %: ^a			
White	86.6	84.6	85.6

Black or African American	9.1	10.8	10.0
American Indian or Alaska Native	2.5	3.2	2.9
Asian ^b	4.3	2.0	3.1
Native Hawaiian or Other Pacific Islander	0.4	1.5	1.0
Family history of breast cancer, %	14.3	15.2	14.8
Have had at least one mammogram, %	64.7	64.1	64.4

Note. $N = 1,108$. Participants could choose multiple races, so percentages may not add to 100.

^a Significant difference between groups, $X^2(3, n = 1,108) = 8.99, p = .029$

^b Significant difference between groups, $X^2(1, n = 1,108) = 4.64, p = .031$

Effects of Comments on Mammography Intentions

Means for all intention measures are presented in Table 5.2. Table 5.3 summarizes results of analyses testing individual hypotheses included in this chapter.

All conditions compared to no comment control. Mean intentions to have a mammogram in the next two years by condition are reported in Figure 5.3. The overall F test for the OLS regression comparing each condition to the NoInfo condition was significant, $F(7, 1100) = 3.17, p = .0025$. Compared to the NoComm condition, participants in NoInfo, BCNoEx and BCEX reported significantly higher intentions to have a mammogram in the next two years ($p < .001, p = .030, \text{ and } p = .004$, respectively).

Table 5.2

Mean Intentions, by Condition

Variable	Condition								Overall <i>F</i> test for regression, <i>F</i> (df)
	NoInfo	NoCom m	FPNoEx	BCNoEx	FPEx	BCEx	FPExRe m	BCExRe m	
<i>n</i>	156	140	160	116	133	143	128	132	
Intention to have mammogram in the next 2 years, <i>M</i>	5.85***	5.04	5.47	5.60*	5.20	5.70**	5.15	5.43	<i>F</i> (7, 1100) = 3.17**
Intention to wait until age 50 to have mammogram, <i>M</i>	2.03*	2.46	2.38	2.14	2.54	2.08	2.48	2.21	<i>F</i> (7, 1100) = 2.08*

Note. $N = 1,108$. Conditions are as follows: NoInfo = no information control, NoComm = no comments control, FPNoEx = false-positive comments without exemplars, BCNoEx = mammogram-detected breast cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected breast cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected breast cancer comments with exemplars removed. Ordinary Least Squares (OLS) regression was used to compare all conditions to the NoComm condition, the condition in which participants received the stimulus news story but no comments. Means that are significantly different from the mean of the NoComm condition are marked with an asterisk.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 5.3

Summary of Analyses Testing Main Effect Hypotheses

Hypothesis Tested	Outcome Variable	Conditions Compared	Wald test result	Conclusion
H1a	Intention to have mammogram in the next two years	FPE _x vs. BCE _x	$F(1, 1100) = 5.27, p = .02$	FPE _x < BCE _x , H1a supported
H1b	Intention to wait until age 50 to have a mammogram	FPE _x vs. BCE _x	$F(1, 1100) = 5.43, p = .02$	FPE _x > BCE _x , H1b supported
H2a	Intention to have mammogram in the next two years	BCNoEx vs. BCE _x	$F(1, 1100) = 0.16, p = .69$	BCNoEx \approx BCE _x , No support for H2a
		BCE _x vs. BCE _x Rem	$F(1, 1100) = 1.43, p = .23$	BCE _x \approx BCE _x Rem, No support for H2a
	Intention to wait until age 50 to have a mammogram	BCNoEx vs. BCE _x	$F(1, 1100) = 0.08, p = .78$	BCNoEx \approx BCE _x , No support for H2a
H2b	Intention to have mammogram in the next two years	FPNoEx vs. FPE _x	$F(1, 1100) = 1.50, p = .22$	FPNoEx \approx FPE _x , No support for H2b
		FPE _x vs. FPE _x Rem	$F(1, 1100) = 0.05, p = .82$	FPE _x \approx FPE _x Rem, No support for H2b
	Intention to wait until age 50 to have a mammogram	FPNoEx vs. FPE _x	$F(1, 1100) = 0.69, p = .41$	FPNoEx \approx FPE _x , No support for H2b
		FPE _x vs. FPE _x Rem	$F(1, 1100) = 0.07, p = .79$	FPE _x \approx FPE _x Rem, No support for H2b

Note. Conditions are as follows: FPNoEx = false-positive comments without exemplars, BCNoEx = mammogram-detected breast cancer comments with no exemplars, FPEX = false-positive comments with exemplars, BCEX = mammogram-detected breast cancer comments with exemplars, FPEXRem = false positive comments with exemplars removed, and BCEXRem = mammogram-detected breast cancer comments with exemplars removed.

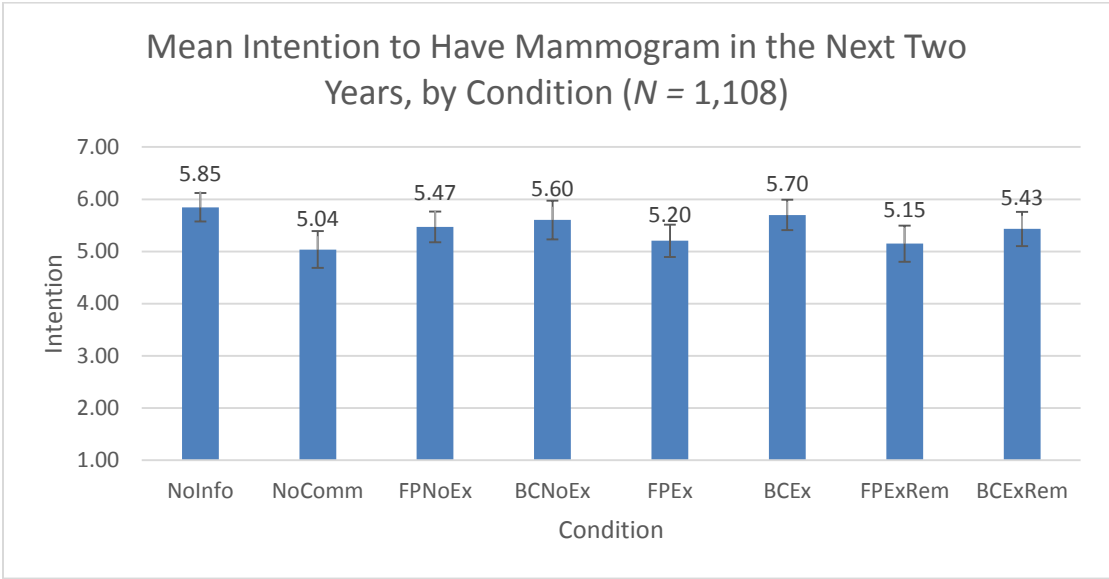


Figure 5.3. Mean participant intention to have a mammogram in the next two years, by condition. Error bars indicate \pm SE.

Figure 5.4 shows mean intentions to wait until age 50 to have a mammogram. The overall F test for the OLS regression comparing all conditions to the NoComm condition was again significant, $F(7, 1100) = 2.08, p = .04$, but only the NoInfo condition was significantly different from NoComm ($p = .03$). BCEX was marginally significantly lower than NoComm ($p = .054$).

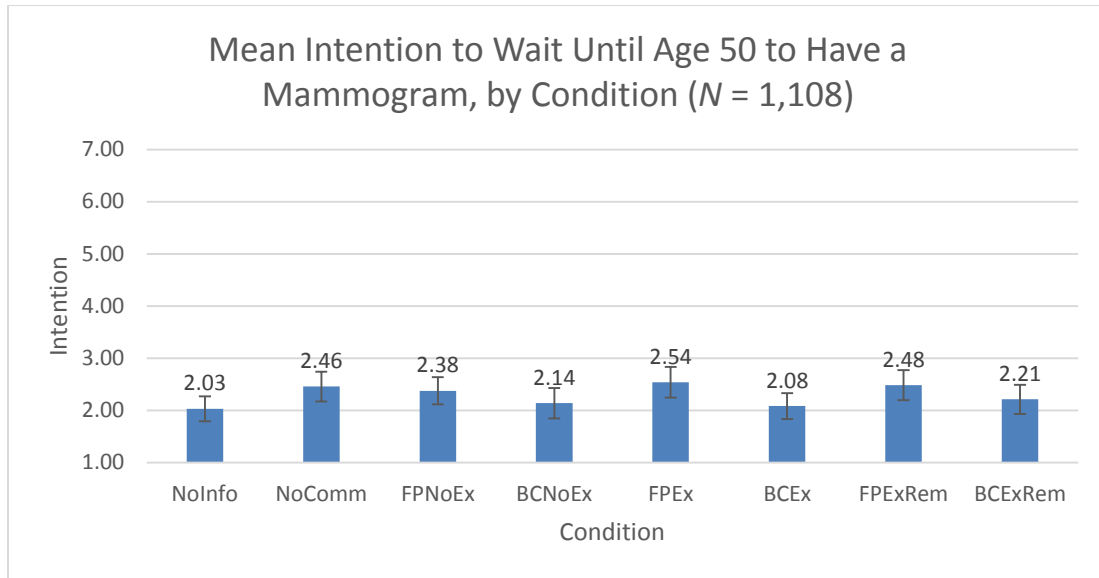


Figure 5.4. Mean participant intention to wait until age 50 to have a mammogram, by condition. Error bars indicate \pm SE.

Effect of comment valence/topic on mammography intentions. Hypothesis 1a predicted that comments with mammogram-detected cancer exemplars (BCEX), when compared to comments with false-positive exemplars (FPEX), would lead to increased intentions to have a mammogram in the next two years. Following the regression comparing each condition to the NoComm condition, a planned contrast (Wald test) showed that intention to have a mammogram in the next two years was significantly higher in BCEX than in FPEX, $F(1, 1100) = 5.27, p = .02$, providing support for H1a (see Table 5.4). A factorial ANOVA was conducted to examine whether there was an interaction between condition (BCEX vs. FPEX) and mammography history (no prior mammogram vs. at least one mammogram). This interaction was significant, ($F(1, 227)$

= 6.49, $p = .01$, such that the hypothesized effect of condition on mammography intention appeared only for women who had had a mammogram (see Figure 5.5).

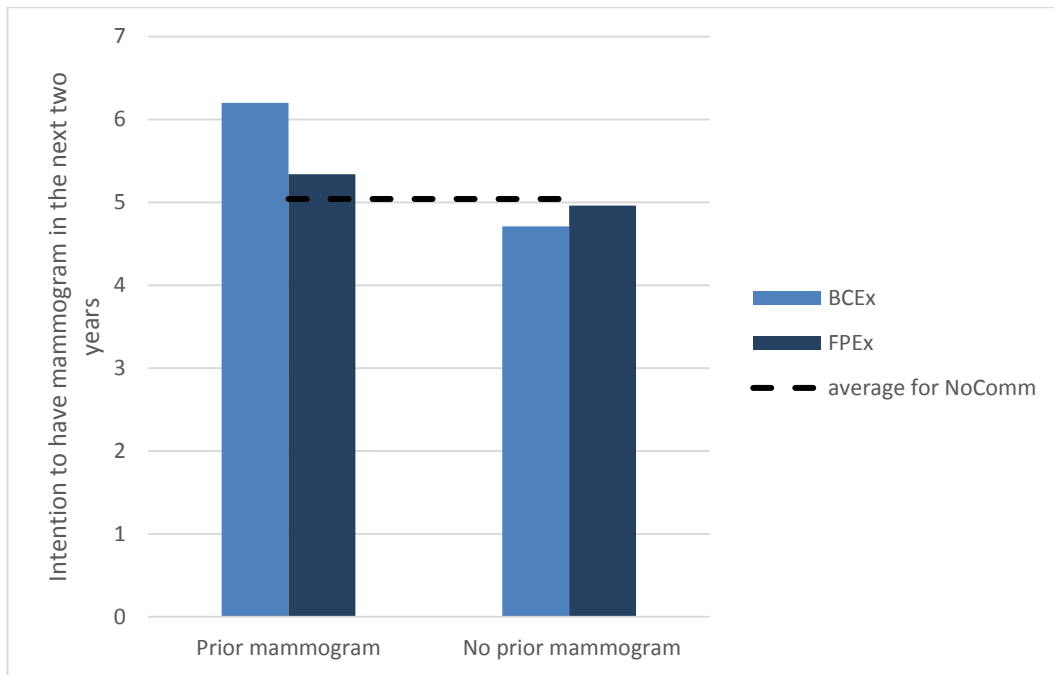


Figure 5.5. Representation of the effect of FPEX condition (vs. BCEx condition) on intention to have a mammogram in the next two years as moderated by history of prior mammogram.

An exploratory Wald test comparing combined conditions FPNoEx, FPEX, and FPEXRem to combined conditions BCNoEx, BCEx, and BCExRem on intention to have a mammogram in the next two years showed that the mammogram-detected breast cancer comments (BCNoEx, BCEx, and BCExRem) had significantly higher intentions, $F(1, 1100) = 5.08, p = .02$. Mean intention to have a mammogram in the next two years in each control condition and each group of conditions (grouped by topic/valence) is shown in Figure 5.6. Mean intention to have a mammogram in the next two years in the NoInfocontrol condition is significantly higher than in the NoComm control condition

($F(1,1100) = 12.69, p < .001$) and in the combined false-positive mammogram conditions ($F(1,1100) = 11.60, p < .001$). Mean intention to have a mammogram in the next two years is also higher in the combined grouping of all mammogram-detected breast cancer conditions than in the NoComm control ($F(1,1100) = 7.05, p = .008$) and the combined false-positive mammogram conditions ($F(1,1100) = 5.08, p = .024$).

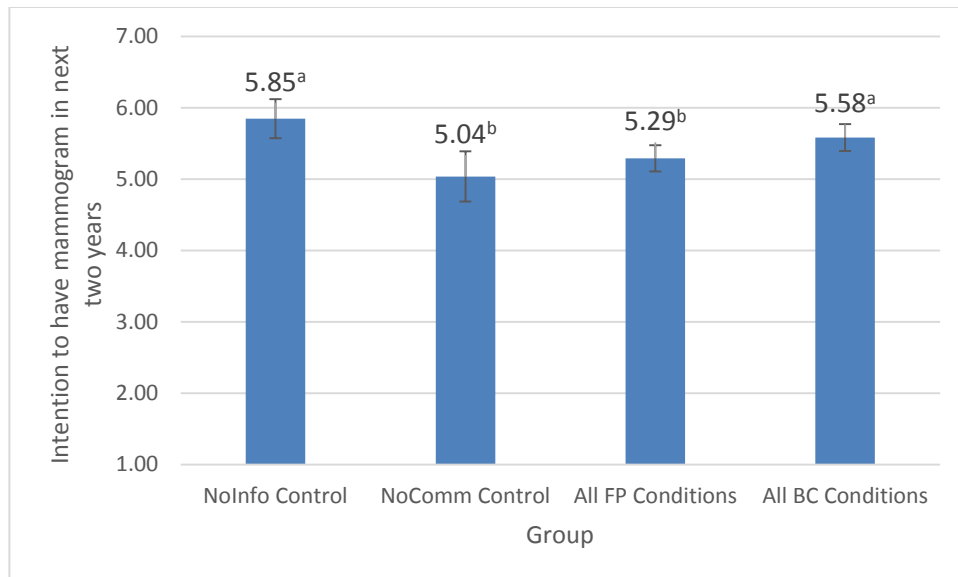


Figure 5.6. Mean intention to have a mammogram in the next two years across control conditions and conditions combined by topic/valence. Error bars indicate \pm SE. Means sharing the same superscript are not significantly different from each other (F test, $p < .05$).

Hypothesis 1b predicted that comments with mammogram-detected cancer exemplars (BCEx), when compared to comments with false-positive exemplars (FPEX), would lead to decreased intentions to wait until age 50 to begin screening. A follow-up Wald test showed that intention to wait until age 50 to have a mammogram was significantly lower in BCEx than FPEX, $F(1, 1100) = 5.43, p = .02$, providing support for

H1b (see Table 5.4). However, an ANOVA showed that there was a significant interaction between condition (BCEx vs. FPEX) and education (recoded to be a continuous variable), $F(1, 272) = 5.15, p = .02$; mammogram-detected breast cancer exemplars did lead to lower intentions to wait until age 50 for the most highly educated women in the sample, but the effect appears to be reversed for women with the lowest level of education (see Figure 5.7).⁷

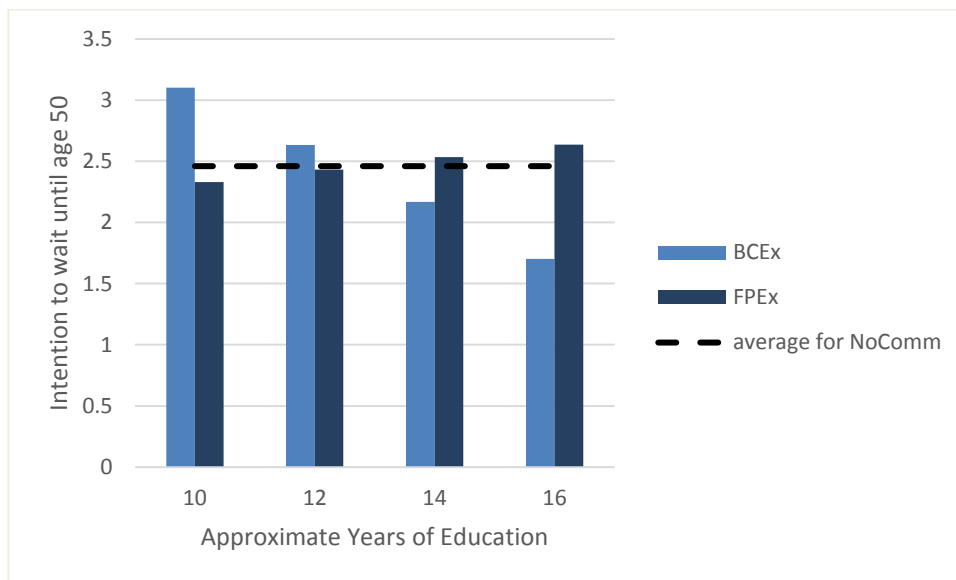


Figure 5.7. Representation of the effect of FPEX condition (vs. BCEX condition) on intention to wait until age 50 to have a mammogram as moderated by education.

An exploratory contrast (using a Wald test) showed that when FPNoEx, FPEX, and FPEXRem were combined and compared to combined conditions BCNoEx, BCEX, and

⁷ Note that 39.8% of the sample had at least a college degree, while only 2.3% had less than a high school degree, so estimates may be unstable for low levels of education.

BCEXRem on intention to wait until age 50 to have a mammogram, mammogram-detected cancer comments (BCNoEx, BCEX, and BCEXRem) had significantly lower intentions, $F(1, 1100) = 7.74, p = .006$. Again, there was a significant moderating effect of education. A factorial ANOVA conducted to examine the interaction between comment topic (all FP conditions vs. all BC conditions) and education (recoded to be a continuous measure) was significant, $F(1, 808) = 4.38, p = .04$, such that higher education led to a positive effect of false-positive comments on intentions to wait until age 50, which diminished for women at lower levels of education (see Figure 5.8). Mean intention to wait until age 50 to have a mammogram for control conditions compared to comment conditions combined by topic/valence are presented in Figure 5.9. In addition to the significant difference between all false positive conditions and all mammogram-detected breast cancer conditions noted above, mean intention to wait until age 50 to have a mammogram in the NoInfo control condition is significantly lower than in the NoComm control condition ($F(1,1100) = 4.98, p = .026$) and in the combined false-positive mammogram conditions ($F(1,1100) = 8.66, p = .003$).

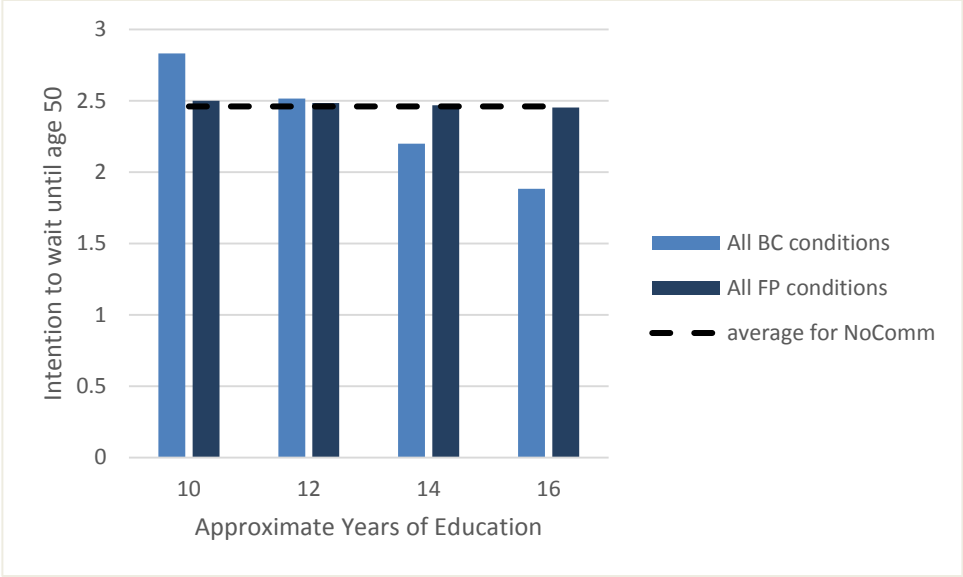


Figure 5.8. Representation of the effect of all false-positive conditions (vs. all mammogram-detected breast cancer conditions) on intention to wait until age 50 to have a mammogram as moderated by education.

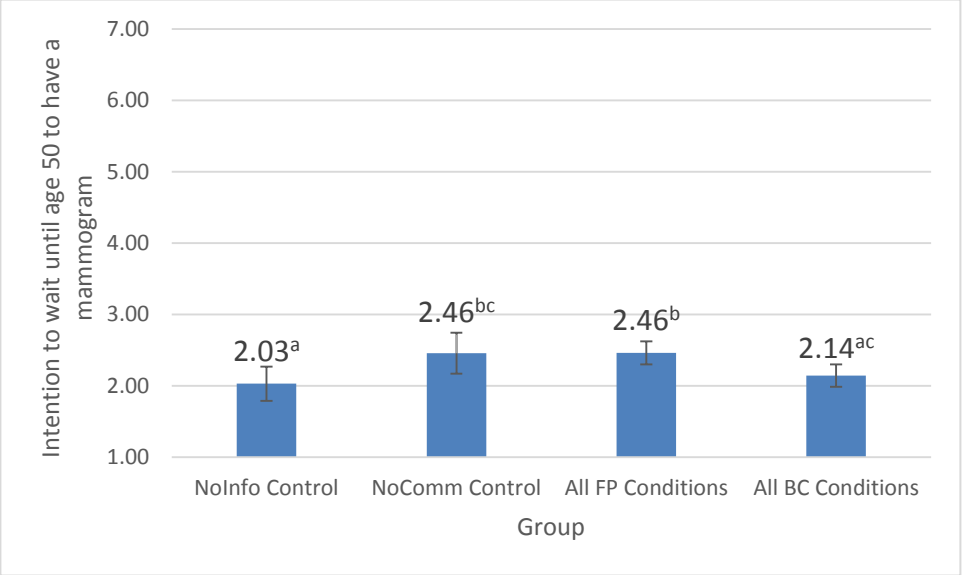


Figure 5.9. Mean intention to wait until age 50 to have a mammogram across control conditions and conditions combined by topic/valence. Error bars indicate \pm SE. Means sharing the same superscript are not significantly different from each other (F test, $p < .05$).

Effect of presence of exemplars on mammography intentions. Following the OLS regressions for each of the intention measures, I used Wald tests to examine the effects of exemplars on intentions to have a mammogram in the next two years and intention to wait until age 50 to have a mammogram. Hypothesis 2a predicted that comments with mammogram-detected cancer exemplars would lead to higher intentions to have a mammogram in the next two years and lower intentions to wait until age 50 when compared to mammogram-detected cancer comments without exemplars. To test this hypothesis, I compared BCNoEx to BCEx and BCEx to BCExRem for both of the intention measures. None of the four tests were significant (see Table 5.4), so there was no support for H2a. However, there was a moderation effect such that the predicted effect of BCEx vs. BCNoEx emerged for women with a history of a prior mammogram (see Figure 5.10); a factorial ANOVA conducted to test the interaction of condition (BCEx vs. BCNoEx) and history of a prior mammogram (no prior mammogram vs. at least one mammogram) showed that the interaction was significant, $F(1, 255) = 5.54, p = .02$. Hypothesis 2b predicted that comments with false-positive exemplars would lead to lower intentions to have a mammogram in the next two years and higher intentions to wait until age 50 when compared to false-positive comments without exemplars. To test this

hypothesis, I compared FPNoEx to FPEX and FPEX to FPEXRem for both intention items. None of the four tests were significant (see Table 5.4), so H2b was also not supported.

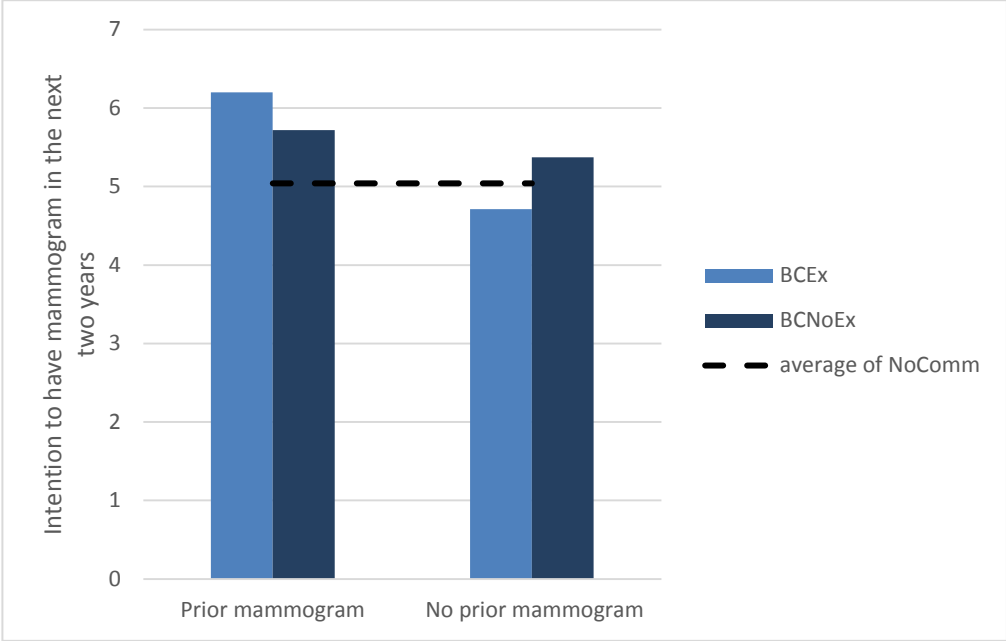


Figure 5.10. Representation of the effect of BCEx condition (vs. BCNoEx condition) on intention to have a mammogram in the next two years as moderated by history of prior mammogram.

I further explored the data by combining nonexemplar conditions of the same valence and comparing them to the appropriate exemplar condition. When BCNoEx and BCExRem were combined and compared to BCEx using Wald tests, cancer exemplars had no significant effect on intention to have a mammogram in the next two years or intention to wait until age 50 to have a mammogram. When FPNoEx and FPEXRem were combined and compared to FPEX, false-positive exemplars had no effect on intention to have a

mammogram in the next two years or intention to wait until age 50 to have a mammogram.

Mediators of Effects of Comments on Mammography Intentions

Hypotheses 3 through 6 predicted that effects of exemplars on mammography intentions would be mediated by narrative transportation, mammography attitudes, mammography norms, and self-efficacy. Despite the lack of direct effects of exemplars on intentions, analyses of possible indirect effects were still necessary and valuable because, as Hayes (2013) points out, indirect effects can be present in the absence of direct effects. Thus, the results of formal tests of indirect effects for each proposed mediator of the effects of condition on mammography intentions are presented in the sections that follow. The mean values of each proposed mediator by condition are presented in Table 5.4. Detailed tables summarizing the results of analyses of each mediator are presented in Appendix F.

Table 5.4

Mediator Means and Standard Deviations, by Condition

Mediator	Condition							
	NoInfo	NoComm	FPNoEx	BCNoEx	FPNoEx	BCEX	FPEXRem	BCEXRem
<i>n</i>	156	140	160	116	133	143	128	132
Narrative transportation, <i>M (SD)</i>	N/A	N/A	4.31 (1.33)	4.39 (1.36)	4.31 (1.49)	4.54 (1.42)	4.29 (1.58)	4.29 (1.40)
Attitude toward having mammogram in next two years, <i>M (SD)</i>	5.67 (1.81)	5.30 (1.80)	5.41 (1.64)	5.46 (1.71)	5.33 (1.57)	5.54 (1.60)	4.88 (1.83)	5.28 (1.57)
Attitude toward waiting until age 50 to have a mammogram, <i>M (SD)</i>	3.19 (1.83)	3.52 (1.65)	3.46 (1.69)	3.25 (1.88)	3.46 (1.73)	3.02 (1.70)	3.35 (1.59)	3.33 (1.77)
Injunctive norm for having mammogram in two years, <i>M (SD)</i>	5.06 (1.71)	4.58 (1.72)	4.84 (1.81)	4.97 (1.78)	4.87 (1.64)	4.89 (1.73)	4.52 (1.73)	4.76 (1.64)
Injunctive norm for waiting until age 50 to have a mammogram, <i>M (SD)</i>	2.69 (1.60)	2.77 (1.53)	2.71 (1.53)	2.76 (1.72)	2.71 (1.48)	2.54 (1.41)	2.93 (1.55)	2.69 (1.48)
Descriptive norm for having mammogram in two years, <i>M (SD)</i>	5.00 (1.45)	4.84 (1.49)	4.89 (1.64)	4.91 (1.50)	4.66 (1.60)	4.87 (1.45)	4.95 (1.46)	4.89 (1.51)
Descriptive norm for waiting until age 50 to have a mammogram, <i>M (SD)</i>	3.63 (1.57)	3.45 (1.55)	3.30 (1.62)	3.05 (1.52)	3.30 (1.60)	3.46 (1.58)	3.23 (1.41)	3.27 (1.56)
Self-efficacy to have a mammogram in the next two years, <i>M (SD)</i>	8.89 (2.88)	8.11 (3.19)	8.50 (2.86)	8.57 (3.08)	8.95 (2.50)	8.80 (2.92)	7.83 (3.23)	8.30 (2.80)

Self-efficacy to wait until age 50 to have a mammogram, <i>M (SD)</i>	5.52 (3.70)	5.39 (3.48)	6.14 (3.50)	4.78 (3.61)	5.74 (3.62)	5.20 (3.75)	5.03 (3.49)	5.62 (3.48)
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Note. Conditions are as follows: NoInfo = no information control, NoComm = no comments control, FPNoEx = false-positive comments without exemplars, BCNoEx = mammogram-detected breast cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected breast cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected breast cancer comments with exemplars removed. The narrative transportation scale was an average of four items from Green and Brock (2000) measured on a 7-point scale from 1 (*not at all*) to 7 (*very much*). Each attitude scale was created by averaging three semantic differential items on a 7-point scale from 1 to 7, where 1 was the negative end of the scale. Norms were measured by having participants rate their agreement with each norm on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Each self-efficacy item (adapted from Bandura, 2006) was measured using a scale from 1 (*could not do at all*) to 11 (*highly certain I could*).

Narrative transportation. In the mammography-detected breast cancer conditions, increased narrative transportation was associated with increased intentions to have a mammogram in the next two years ($b = 0.187$ for BCEx and BCNoEx, and $b = 0.217$ for BCEx and BCExRem) and decreased intention to wait until age 50 to have a mammogram ($b = -0.211$ for BCEx and BCNoEx, and $b = -0.205$ for BCEx and BCExRem; see Tables F1 and F2). However, because exemplars had no effect on transportation, bias-corrected 95% confidence intervals constructed using 10,000 bootstrap samples included zero for all of the indirect effects through transportation that were tested. Thus, there is no evidence that effects of exemplars on mammography intentions are mediated by transportation in this experiment and no support for **H3**.

Attitude. When compared to FPExRem, FPEx led to a more positive attitude toward having a mammogram in the next two years ($a = 0.453$)⁸, and more positive attitude led to higher intentions to have a mammogram in the next two years ($b = 0.561$). A bias-corrected bootstrap 95% confidence interval for the indirect effect of FPEx vs. FPExRem on intention through attitude ($ab = 0.254$) based on 10,000 bootstrap samples was above zero (0.026, 0.521), providing evidence of mediation and partial support for **H4**. The path between condition and attitude was not significant in the other models tested (see Table F3). However, paths between attitudes and intentions were significant in all of the models, with more positive attitudes toward having a mammogram in the next two years consistently related to greater intentions to have a mammogram in the next

⁸ a and b refer to path coefficients in Figure 5.1.

two years. Similarly, a more positive attitude toward delaying mammography was significantly related to increased intentions to wait until age 50 to have a mammogram (see Table F4), but there was no evidence that effects of exemplars on intentions to wait until age 50 to have a mammogram are mediated by attitude.

Mammography norms. Exemplar conditions did not significantly change injunctive or descriptive norms toward having a mammogram in the next two years; however, stronger perceived injunctive norms related to having a mammogram in the next two years were associated with significantly higher intentions to have a mammogram in the next two years. Additionally, in the two instances in which exemplars were compared to conditions in which exemplars were removed (FPEX vs. FPEXRem and BCEX vs. BCEXRem), descriptive norms were also significantly positively related to mammography intentions ($f = 0.178$ and $f = 0.278$, respectively, see Table F5)⁹. Bias-corrected 95% confidence intervals constructed using 10,000 bootstrap samples included zero for all of the indirect effects tested, thus there was no evidence that effects of exemplars on intentions to have a mammogram in the next two years were mediated by norms related to having a mammogram in the next two years.

There was one instance in which exemplars had an effect on norms related to waiting until age 50 to have a mammogram; when BCEX was compared with BCNoEx, the presence of exemplars led to a significant increase in descriptive norms ($d = 0.409$, see Table F6). However, in all cases, both injunctive norms and descriptive norms were

⁹ Path coefficients for models including norms refer to paths identified in Figure 5.2.

significantly and positively related to intentions to wait until age 50 to have a mammogram. Bias-corrected 95% confidence intervals constructed using 10,000 bootstrap samples included zero for all but one of the indirect effects tested. When BCEx was compared with BCNoEx, the indirect effect of exemplars on intentions to wait until age 50 to have a mammogram through descriptive norms ($ab = 0.079$) was above zero (95% CI [0.008, 0.190]). Thus, **H5** was only partially supported.

Self-efficacy. There were no significant effects of exemplars on self-efficacy. However, higher self-efficacy was significantly associated with higher mammography intentions both when BCEx was compared to BCNoEx ($b = 0.099$) and when BCEx was compared with BCExRem ($b = 0.229$; see Table F7). Bias-corrected bootstrap 95% confidence intervals for the indirect effects of exemplars on intentions through self-efficacy included zero, thus there is no evidence that effects of exemplars on intentions to have a mammogram in the next two years are mediated by self-efficacy and no support for **H6**.

Exploratory analyses of mediators of effects of topic/valence on intentions. In addition to the mediation analyses necessitated by Hypotheses 3 through 6, I also undertook exploratory analyses to investigate the mechanisms behind the effects of comment topic and valence on mammography intentions. I tested transportation, attitudes, norms, self-efficacy, and negative affect as possible mediators of these effects. Only attitude toward waiting until age 50 to have a mammogram was a mediator of these effects. As shown in Table 5.5, BCEx (as compared to FPEX) made attitudes toward waiting more negative, which led to an increase in intentions to have a mammogram in

the next two years (because attitudes toward waiting are negatively related to intentions to screen). Because attitudes toward waiting are positively associated with intentions to wait until age 50 to have a mammogram, there was also a significant indirect effect of BCEx on intention to wait to have a mammogram through attitudes toward waiting. Finally, when all mammogram-detected breast cancer conditions (BCEx, BCNoEx, and BCExRem) are combined and compared to all false positive conditions (FPEx, FPNoEx, and FPExRem), the effect of breast cancer conditions on intention to have a mammogram in the next two years is mediated by attitudes toward waiting; breast cancer conditions lead to more negative attitudes toward waiting, which are negatively related to intentions to screen in the next two years.

Table 5.5

Mediating Effects of Attitude toward Waiting until Age 50 to Have a Mammogram

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (attitude), Coeff. (SE)	Effect of M (attitude) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
BCE _x vs. FPE _x → attitude toward waiting	3.460 (0.149)***	-0.438 (0.207)*	—	—	0.016	4.46 (1, 271), p = .036	
Attitude toward waiting → intention to have mammogram; BCE _x vs. FPE _x → intention to have mammogram	6.277 (0.259)***	—	-0.308 (0.061)***	0.334 (0.210)	0.102	15.25 (2, 270), p < .001	0.135 (0.019, 0.299)
BCE _x vs. FPE _x → attitude toward waiting	3.460 (0.149)***	-0.438 (0.207)*	—	—	0.016	4.46 (1, 271), p = .036	

Attitude toward waiting → intention to wait; BCEx vs. FPEx → intention to wait	1.253 (0.225)***	—	0.369 (0.053)***	-0.269 (0.183)	0.167	26.99 (2, 270), $p < .001$	-0.162 (-0.351, -0.018)
All BC vs. all FP → attitude toward waiting	3.427 (0.084)***	-0.232 (0.121)	—	—	0.005	3.62 (1, 802), $p = .057$	
Attitude toward waiting → intention to have mammogram; All BC vs. all FP → intention to have mammogram	6.183 (0.158)***	—	-0.260 (0.038)***	0.238 (0.131)	0.062	26.34 (2, 801), $p < .001$	0.060 (0.002, 0.137)

Note. Conditions are as follows: FPNoEx = false-positive comments without exemplars, BCNoEx = mammogram-detected breast cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected breast cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected breast cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

This study assesses the effects of valence and the presence of exemplars in online mammography news commentary on young women. In particular, it examines the effects of comments on mammography intentions, including intentions to have a mammogram in the next two years and intentions to wait until age 50 to have a mammogram. It also investigates possible mechanisms of these effects, including moderating effects of participant education and history of prior mammogram and mediating effects of transportation, attitude, norms, and self-efficacy. The results of tests of hypotheses related to the main effects of comments, results of tests of mediation effects, and incidental findings are discussed below.

Effects of Comment Topic

Results showed that participants in conditions with comments about mammogram-detected breast cancer (when BCNoEx, BCEx, and BCExRem were treated collectively) reported higher intentions to have a mammogram in the next two years than participants in conditions with comments about false-positive mammograms (FPNoEx, FPEx, and FPExRem, collectively). Participants in BCNoEx, BCEx, and BCExRem also reported significantly lower intentions to wait until age 50 to have a mammogram. Additionally, participants in BCEx had significantly higher intentions to have a mammogram in the next two years and significantly lower intentions to wait until age 50 than participants in FPEx, providing support for H1a and H1b, respectively.

Because all mammogram-detected cancer comments used in the experiment were pro-mammogram and all false-positive mammogram comments were cautious toward

mammography, the effects of valence and topic are intertwined, meaning that these effects were due to differences in comment valence, differences in content, or a combination of the two. One explanation for the differing effects of mammogram-detected cancer comments and false positive comments on mammography intentions is their differing valence toward mammography: women who read pro-mammogram comments were more likely to intend to have mammograms than women who read comments that were cautious toward mammograms. This effect is supported by prior literature, which has found effects of comment valence on various outcomes, including perceived effectiveness of the message accompanied by the comments (Walther, DeAndrea, Kim, & Anthony, 2010), opinions (Lee & Jang, 2010; Witteman, Fagerlin, Exe, & Zikmund-Fisher, 2013) and behavioral intentions (Witteman, Fagerlin, Exe, & Zikmund-Fisher, 2013).

Effect of Exemplars in Comments

Though there were significant effects of comment valence and topic, there were no main effects of the presence of exemplars on mammography intentions. This was true regardless of whether exemplar and nonexemplar conditions were compared collectively or individually. Thus, **H2a** and **H2b** were not supported. One possibility for why I saw an effect of comment topic but not an effect of exemplars could be that, while the effect of topic or valence is immediate, the effect of exemplars emerges only over time. Specifically, Zillmann (2002) proposes that, because “concrete events” (p. 29) are retained more easily than abstract information, and exemplars are presumably more concrete than similar information without exemplars, exemplars will continue to “exert

unopposed influence on judgment” (p. 29). Though the effects of the experimental manipulation in all conditions is expected to decay over time, one might expect the effect of the exemplar conditions to fade more slowly such that a “sleeper effect” emerges (Zillmann, 2002, p. 29). This could be explored in future research.

The failure to find effects of exemplars could also be due, in part, to failure of participants to read the comments thoroughly leading to a lack of sufficient exposure to the manipulation. For example, in conditions with comments, median time spent on the comment page ranged from a low of 29 seconds for Condition 8 (cancer exemplars removed) to a high of 57 seconds for Condition 5 (false-positive exemplars). The average set of comments in Condition 8 was 398 words, and the average set of comments in Condition 5 was 584 words. Typical reading speeds in experimental studies involving reading on computer screens (Knoblauch, Arditi, & Szlyk, 1991) and smartphones (Na, Choi, & Suk, 2016) are roughly 300 words per minute. At these speeds, it should take readers an average of 80 seconds to read the comments in Condition 8 and an average of 117 seconds to read the comments in Condition 5. Since the average observed times were lower than predicted, it is plausible that some participants skimmed comments rather than reading them thoroughly. To investigate this possibility, I included a dichotomous reading time variable as a possible moderator of effects of condition on intention. In eight tests including an interaction term between condition and the reading time variable (comparing each exemplar condition to each of its corresponding nonexemplar condition for both measures of intention), no significant interaction effects emerged. When FPEx was compared to FPNoEx, the standardized coefficient of the interaction effect was

largest, at -0.21, and approached significance ($p = .063$). While this could mean that reading time was not a factor in the absence of effects of exemplars, it is also possible that the study did not have enough power to detect moderation effects.

Effect of Presence of Comments

Similar to findings from Shi, Messaris, and Cappella (2014) that the presence of any comments (positive or negative) detracted from the perceived effectiveness of the message, in the present research, the presence of any comments may have had harmful effects on readers by altering the effects of the news article. An incidental finding of my research is that, compared to the NoInfo condition, the NoComm condition led to decreased intentions to have a mammogram in the next two years. Conditions in which participants viewed the news story and a set of comments generally increased intentions to have a mammogram in the next two years. For women in this experiment, choosing to delay mammography until age 50 is consistent with current USPSTF recommendations outlined in the stimulus news article, thus lowering intentions to have a mammogram in the next two years could be considered a desirable outcome.

Moderation of Effects

Three of the effects of condition on intention were moderated by education level: FPEX vs. FPNoEX on intentions to have a mammogram in the next two years, FPEX vs. BCEX on intention to wait until age 50 to have a mammogram, and all false positive conditions vs. all mammogram-detected breast cancer conditions on intention to wait

until age 50.¹⁰ In each of these cases, the expected effects appeared for the most highly educated participants but weakened with lower levels of education. This is suggestive of an effect of participant ability to attend to and process the text presented in the experimental manipulation. The Elaboration Likelihood Model (Petty & Cacioppo, 1981, 1986a, 1986b) proposes that those who are motivated and able to process a persuasive message are more likely to do so through the central route, which produces more enduring persuasive effects than processing through the peripheral route. Participants with higher levels of education may have been both more motivated to attend to messages (due to higher need for cognition) and more capable of processing messages, leading to stronger effects of exemplars.

Similarly, the effect of exemplars (BCE_x vs. FPE_x and BCE_x vs. BCNo_x) on intentions to have a mammogram in the next two years was strengthened among women with a history of prior mammography.¹¹ This is indicative of an effect of higher motivation to process the experimental manipulation. Women who had previously made the decision to have a mammogram may also have a higher risk for breast cancer, higher levels of breast cancer worry, or greater interest in health issues in general that would also motivate them to pay attention to messages about mammography. This is also

¹⁰ Three out of 12 (or 25% of) tests examining the interaction between conditions (or sets of conditions) and education were significant, which is greater than the percentage expected by chance with an alpha level of .05.

¹¹ Two out of 12 (or 16.7% of) tests examining the interaction between conditions and mammography history were significant, which is greater than the percentage expected by chance with an alpha level of .05.

consistent with effects proposed in the Elaboration Likelihood Model, and higher levels of motivation likely led to stronger effects of exemplars.

Mediation of Effects

The results presented in this chapter also show that there is little to no support for the proposed mediators of the effects of exemplars on mammography intentions (**H3**, **H4**, **H5**, and **H6**). Attitude toward having a mammogram in the next two years successfully mediated one relationship between exemplars and intentions, and mammography norms mediated another. There was no evidence of indirect effects of exemplars on mammography intentions through narrative transportation (proposed in **H3**) or self-efficacy (proposed in **H6**). Though exemplars often failed to have the predicted effects on proposed mediators, those mediator variables were often significantly associated with the outcome of interest. There was evidence that, for mammogram-detected cancer exemplar conditions, increased narrative transportation was associated with an increase in intentions to have a mammogram in the next two years and a decrease in intentions to wait until age 50 to have a mammogram. There was also evidence that attitudes, perceived norms, and self-efficacy were significantly related to behavioral intention, as predicted by the Integrative Model (Fishbein, 2000).

The lack of hypothesized mediation effects is contrary to prior literature on exemplars, which suggests that they have their effects through changes in narrative transportation (Kim, Bigman, Leader, Lerman & Cappella, 2012), attitudes (Green, 2006), norms (Hinyard & Kreuter, 2007), and self-efficacy (Bandura, 1977; Bandura, 1986). The lack of mediation effects might be expected, however, since there was little

evidence that exemplar conditions changed mammography intentions (when compared to nonexemplar conditions). In addition to a lack of effects of exemplar conditions on intentions, exemplars also failed to have an effect on the proposed mediators: narrative transportation, attitudes, norms, and self-efficacy. Because narrative transportation is typically associated with becoming immersed in a longer narratives—narratives in some previous research have spanned several pages (e.g. Green & Brock, 2000)—it is possible that the comments were not long enough to create a sense of transportation. Other research that found the effect of exemplars on intention was mediated by engagement (Kim, Bigman, Leader, Lerman & Cappella, 2012) embedded exemplars in the text of a longer news article. Further, Green (2006) describes ways in which transportation can lead to changes in attitude, norms, and efficacy, so the failure to find effects on these variables may be partially due to the lack of effects on transportation.

Though the predicted mediation paths were not present, I also conducted mediation analyses in an attempt to understand the main effects of comments on mammography intentions that did exist. The effect of BCEx vs. FPEx was mediated by attitude toward waiting until age 50 to have a mammogram, and the effect of all mammogram-detected breast cancer conditions (BCEx, BCNoEx, and BCExRem combined) vs. all false positive conditions (FPEx, FPNoEx, and FPExRem combined) was mediated by attitude toward waiting until age 50. It is possible that this attitude was malleable because participants did not have a pre-existing attitude toward waiting until age 50, whereas attitudes toward having a mammogram in the next two years were likely well-formed and influenced by numerous social and cognitive factors. Future research

should examine the interplay between effects of attitudes toward having a mammogram and attitudes toward waiting on intentions, especially in the context of attitudinal ambivalence--“a psychological state in which a person holds mixed feelings (positive and negative) towards some psychological object” (Gardner, 1987,p. 241). This mediation pathway also suggests a possible avenue for messaging related to mammography decision-making, in that those hoping to change intentions should target not only attitudes toward having a mammogram but also attitudes toward waiting to have a mammogram.

Limitations

Although this research has many strengths and exciting implications, it also has a number of conceptual and methodological limitations.

First, though the choices made in designing conditions and selecting the experimental stimuli offer advantages over prior work in this area, they also present limitations. Most importantly, the decision to use comments in the mammogram-detected breast cancer conditions that were all pro-mammogram and comments in the false-positive mammogram conditions that were cautious toward mammography means that valence and content are conflated and their effects cannot be teased apart in this experiment. Originally, this decision was made to produce a cleaner and simpler experimental design. In retrospect, it could have been advantageous to select comments for each set of conditions that proportionally represented the valences of comments on their respective topic. Another option would have been to introduce a valence factor and include additional conditions such that the experimental factors of valence, topic, and

presence of exemplars were fully crossed. An additional conceptual limitation that may have limited my ability to find effects is my operationalization of an exemplar as a mention of an individual in a comment. Definitions of exemplar vary widely, and one conceptualization refers to exemplars as “short quotations...from concerned or interested people that illustrate a particular problem or a particular view” (Brosius, 1999, p. 213). Using this definition, all comments could be considered exemplars, which could mean that they are all expected to have stronger effects than nonexemplar text (i.e., parts of the article without exemplars).

This research also has limitations that are related to the methodology. One of these limitations is that, while participants were asked not to use mobile phones to complete the survey, based on survey metadata, it appears that approximately 50% accessed the survey from a small mobile device. Allowing participants to be exposed to the content on a mobile phone may simulate real conditions in which people are exposed to media content and user-generated comments, thus increasing external validity. However, it raises concerns about participants’ exposure to the manipulation and ability to complete measures, which were not all optimized for mobile phones. Though few moderation effects of mobile phone use were found, this may have weakened effects or introduced additional error (i.e., “noise”) making it more difficult to find effects. Related to this issue is the finding that many participants spent only a short amount of time on the comment page, which was the primary experimental manipulation. Though some effects of comments were observed (e.g., effects of topic on intention and risk perceptions) and

no significant moderating effect of the reading time variable was found, it is possible that the brevity of exposure may have contributed to a lack of effects of exemplars.

This research also possesses limitations related to generalizability. One of the strengths of this study is that it takes place in an online context, as exposure to online news commentary would. However, other aspects of the setting, including the layout of the stimulus article and comments, were simplified for the experiment and findings may not be representative of results of exposure to all online news and commentary.

Similarly, the findings are limited because of the experimental stimuli. I only used one article, so the effect of comments used with this particular article may differ from effects of comments with other articles. Additionally, though one of the strengths of the study is that the stimulus comments were real comments found on mammography articles from *The New York Times*, I could not use all of the coded comments because some would not make sense with the article. This may limit generalizability to other types of comments that were not used or to comments and articles found in other media outlets. Additionally, this experiment included only false-positive comments that were cautious toward mammography and mammogram-detected breast cancer comments that were pro-mammography for experimental simplicity. This means one can generalize findings to most but not all false positive comments and mammogram-detected breast cancer comments. Finally, the population used in this experiment was selected because women between the ages of 40 and 50 years old are the ones who have been affected by changes in mammography guidelines and, according to guidelines from the USPSTF (2016), have

an individual decision to make about when to begin screening. These findings cannot necessarily be extended to other populations.

Implications

This research on the effects of user-generated commentary on online mammography news has valuable implications. First, findings suggest that the topic of user-generated mammography comments may have an effect on mammography intentions, with those about mammogram-detected breast cancer exemplars leading to higher intentions to screen in the next two years than when the story was presented along with comments about false positives or with no comments at all. Because having a mammogram between age 40 and 50 is not universally recommended, exposure to these comments may nudge women to screen, putting them at risk for excess false positives and unnecessary procedures. The findings suggest that producers of online news and managers of news websites and any others on which user comments are allowed should be aware that comments can have harmful effects on readers and may detract from the effects of the main message.

Though the hypothesized mediation pathways were not significant, mediation analyses provided insight into why exemplars did not produce the predicted effects on mammography intentions and further understanding of perceived risk and theories of behavioral prediction in the mammography context. Because attitudes, norms, and self-efficacy reliably predicted behavioral intentions, this research offers additional support for the validity of applying the Integrative Model (Fishbein, 2000) and Reasoned Action Model (Fishbein & Ajzen, 2010) to mammography behavior.

CHAPTER 6

THE EFFECTS OF ONLINE NEWS COMMENTARY ON RISK PERCEPTIONS

Introduction

This chapter presents results from an online experiment to examine the effects of online news commentary on women's risk perceptions. Results include the effects of comments on perceived five-year and lifetime risks of developing breast cancer, perceived risk of having a positive mammogram, and perceived risk of having a false-positive mammogram result. It also presents results of analyses investigating mechanisms of action underlying effects of comments on risk perceptions. Further detail about the hypotheses outlined below can be found in Chapter 3.

Hypotheses

I made multiple predictions about the effects of comments with exemplars on risk perceptions related to breast cancer and mammography. Based on the quantification heuristic and the availability heuristic (Zillmann, 2006), I predicted that comments with exemplars would alter risk perceptions by prompting readers to rely on those examples when estimating their own risk for breast cancer, a positive mammogram, or a false-positive mammogram result:

H7a: The presence of comments with mammogram-detected cancer exemplars will be associated with increased perceived breast cancer risk when compared to the presence of mammogram-detected cancer comments without exemplars (i.e., nonexemplar comments of the same valence and topic).

H7b: The presence of comments with mammogram-detected cancer exemplars will be associated with increased perceived risk of a positive mammogram when compared to the presence of mammogram-detected cancer comments without exemplars (i.e., nonexemplar comments of the same valence and topic).

H7c: The presence of comments with false positive exemplars will increase perceived risk of experiencing a false positive when compared to the presence of false positive comments without exemplars (i.e. nonexemplar comments of the same valence and topic).

Exemplars were also expected to affect perceived risk of breast cancer, perceived risk of having a positive mammogram, or perceived risk of having a false-positive mammogram, depending on experimental condition. These effects were expected to be at least partially mediated by the effects of exemplars on affect. Dunlop, Wakefield, and Kashima (2008) have outlined a theory in which testimonial messages increase negative emotions, which then increase perceived susceptibility to a disease. In a demonstration of this effect, McQueen, Kreuter, Kalesan, and Alcaraz (2011) found that the effect of breast cancer survivor stories on increased breast cancer risk perceptions was mediated by negative affect. Thus, I predicted the following:

H8a: The effects of mammogram-detected breast cancer exemplars (compared to comments that are of the same valence and topic but lack exemplars) on perceived risk of breast cancer will be mediated by changes in negative affect.

H8b: The effects of mammogram-detected breast cancer exemplars (compared to comments that are of the same valence and topic but lack exemplars) on perceived risk of having a positive mammogram will be mediated by changes in negative affect.

H8c: The effects of false-positive mammogram exemplars (compared to comments that are of the same valence and topic but lack exemplars) on perceived risk of having a false-positive mammogram will be mediated by changes in negative affect.

Finally, I proposed that exemplars would alter mammography intentions through their effects on risk perceptions. Though there is not much evidence for this mediation pathway between exemplars and mammography behavior, it has been demonstrated for other health behaviors. Betsch, Ulshofer, Renkewitz, and Betsch (2011) found that the relationship between narratives about adverse vaccine events and vaccination intentions was mediated by perceived risk of experiencing an adverse event. Similarly, de Wit, Das, and Vet (2008) found that the effect of personal testimonials on intention to get vaccinated for hepatitis B was mediated by perceived risk of contracting the hepatitis B virus. I hypothesized that this effect would also exist in the present research:

H9: The effects of exemplars (compared to comments that are of the same valence and topic but lack exemplars) on mammography intentions will be mediated by risk perceptions.

Methods

This study used an experiment embedded in an online survey to examine the effects of mammography news commentary on readers. Participants were randomly assigned to one of eight conditions (see Table 4.1), with conditions varying on the presence or type of comments displayed. These conditions are further described in Chapter 4.

Participants

Survey Sampling International recruited women in the United States between the ages of 38 and 48 years to participate in the study ($N = 1,108$) who no history of breast cancer or genetic mutations related to breast cancer. Full participant characteristics are available in Chapter 4.

Measures

The focal dependent variables of interest in this chapter are perceived risk of having breast cancer (5-year and lifetime risk, measured as both a percentage and a frequency out of 100), perceived risk of having a positive mammogram (measured as a percentage and a frequency out of 100), and perceived risk of having a false-positive mammogram (measured as a percentage and a frequency out of 100). Detailed descriptions of measures used are available in Chapter 4, and the full questionnaire is available in Appendix C.

Research Design, Stimuli, and Procedure

See Chapter 4 for full details of the experimental design, procedure, and stimuli.

Analytic Approach

Main effects. To examine the effects of condition on each of the dependent measures of risk perception, I used Ordinary Least Squares (OLS) regression with the NoComm condition as the comparison condition. I then followed each regression with Wald tests to test individual hypotheses and to examine the main effects of presence of exemplars and valence/topic. To test Hypothesis 7a, I used a separate OLS regression for each of the four measures of breast cancer risk perception, each time following the regressions with Wald tests to compare BCNoEx with BCEx and BCEx with BCExRem. I used OLS regression to test Hypothesis 7b, using the two measures of perceived risk of having a positive mammogram and using Wald tests to contrast BCNoEx with BCEx and BCEx with BCExRem. Finally, I also used OLS regression to test Hypothesis 7c with two measures of perceived risk of having a false-positive mammogram and used Wald tests to contrast FPNoEx to FPEx and FPEx to FPExRem.

Moderation. I explored the moderating effects of participant education, family history of breast cancer, history of prior mammogram, survey response time (dichotomous: less than one half of the mean response time for respective condition vs. greater than or equal to one half of the mean time), and use of a mobile phone to answer the survey on the relationship between condition and perceived risk measures using factorial ANOVA and OLS regression.

Mediation models. The mediation hypotheses tested in this chapter, Hypotheses 8 and 9, involved comparing an exemplar condition to a nonexemplar condition of the same topic and valence (i.e., FPEx vs. FPNoEx, FPEx vs. FPExRem, BCEx vs. BCNoEx,

and BCEx vs. BCExRem. In each of these comparisons, a dummy variable was created for condition such that the condition with exemplars was coded as “1” and the nonexemplar condition was coded as “0.” Mediator and outcome variables were interval or ratio. Hypotheses 8 and 9 involved testing a simple mediation model as illustrated in Figure 5.1. The mediator (M) and the dependent variable (Y) varied based on the hypothesis being tested. All models were tested using PROCESS for SPSS (Hayes, 2016) with SPSS version 22. I used bootstrapping to create bias-corrected 95% confidence intervals for indirect effects as recommended by Hayes (2009, 2013).

Results

Mobile Phone Use

Participant characteristics by mobile phone use are summarized in Chapter 5. Most tests of the use of mobile phones to take the survey as a moderator of the effects of condition on outcome variables were not significant. However, taking the survey on a mobile phone significantly moderated the effect of BCEx vs. BCNoEx on perceived five-year risk of breast cancer such that the BCNoEx condition increased perceived risk for mobile users and decreased perceived risk for non-mobile users (i.e., the interaction term in a 2x2 ANOVA was significant, $F(1, 255) = 5.79, p = .017$; see Figure 6.1). It also moderated the effect of topic/valence on perceived risk of experiencing a false positive, such that topic/valence had little effect for those who completed the survey on a mobile phone (the interaction was significant, $F(1, 807) = 3.99, p = .046$). For those who did not use a mobile phone, comments about mammogram-detected breast cancer led to lower

perceived risk of a false positive than did comments about false-positive mammograms (see Figure 6.2).¹²

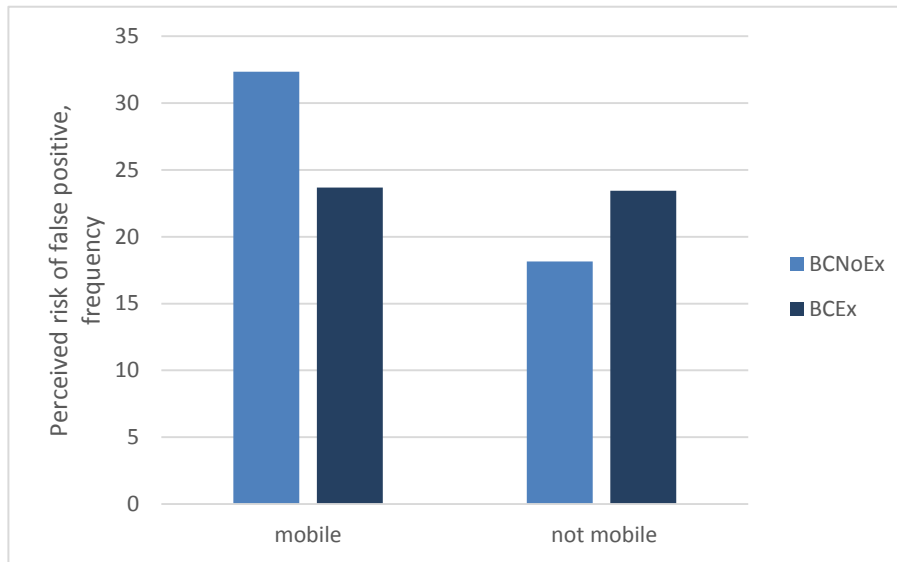


Figure 6.1. Use of mobile phone to answer survey as a moderator of effect of BCNoEx condition (vs. BCEX) on perceived risk of a false positive.

¹² Two out of 24 (or 8.3% of) tests of the interaction between using a mobile phone and condition were significant, which is only slightly higher than the percentage expected by chance with an alpha level of .05.

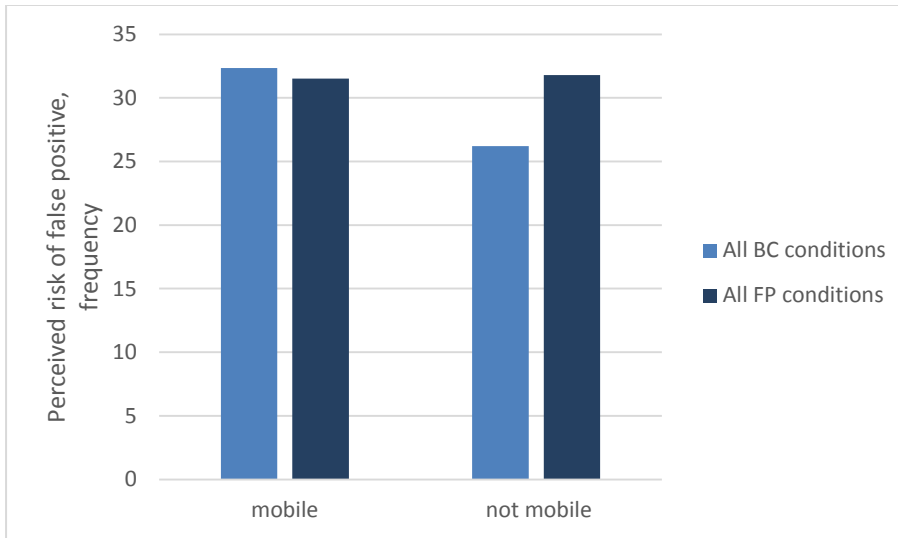


Figure 6.2. Use of mobile phone to answer survey as a moderator of effect of conditions with comments about mammogram-detected breast cancer (vs. comments about false positives) on perceived risk of a false positive.

Main Effects of Comments on Perceived Risk

Means for all measures of perceived risk are presented in Table 6.1. Table 6.2 summarizes results of analyses testing Hypotheses 7a, 7b, and 7c.

Table 6.1

Mean Risk Perceptions, by Condition

Variable	Condition								Overall <i>F</i> test for regression, <i>F</i> (df)
	NoInfo	NoCom m	FPNoEx	BCNoEx	FPEX	BCEX	FPEXRe m	BCEXRe m	
<i>n</i>	156	140	160	116	133	143	128	132	
Perceived 5-year breast cancer risk as a frequency, <i>M</i>	29.9**	21.6	25.2	31.4***	24.8	25.6	24.5	27.6*	<i>F</i> (7, 1100) = 2.78**
Perceived lifetime risk of breast cancer as a frequency, <i>M</i>	41.2***	30.8	32.0	36.9*	31.9	35.8*	30.5	36.2*	<i>F</i> (7, 1100) = 4.17***
Perceived 5-year risk of breast cancer as a percentage, <i>M</i>	25.7*	19.6	20.8	24.3	22.7	23.6	23.8	25.6*	<i>F</i> (7, 1094) = 1.39
Perceived lifetime risk of breast cancer as a percentage, <i>M</i>	32.7**	25.2	26.4	29.9	29.2	29.1	28.4	30.6*	<i>F</i> (7, 1095) = 1.48
Perceived risk of experiencing a	25.1*	19.4	20.9	23.2	23.5	20.7	23.4	24.0*	<i>F</i> (7, 1098) = 1.39

positive mammogram as a frequency, <i>M</i>	23.9*	18.1	19.1	21.3	19.5	17.6	23.4	22.2	$F(7, 1096) = 1.68$
Perceived Risk of Experiencing a Positive Mammogram as a Percentage, <i>M</i>									
Mean perceived risk of experiencing a false-positive mammogram as a frequency, <i>M</i>	32.3*	27.3	28.7	29.7	31.1	26.5	35.9**	31.8	$F(7, 1098) = 2.59^*$
Mean perceived risk of experiencing a false-positive mammogram as a percentage, <i>M</i>	31.5	25.9	27.6	27.6	29.2	25.6	35.0**	31.9*	$F(7, 1098) = 2.27^*$

Note. $N = 1,108$. Conditions are as follows: NoInfo = no information control, NoComm = no comments control, FPNoEx = false-positive comments without exemplars, BCNoEx = mammogram-detected breast cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected breast cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected breast cancer comments with exemplars removed. Ordinary Least Squares (OLS) regression was used to compare all conditions to the NoComm condition, the condition in which participants received the stimulus news story but no comments. Means that are significantly different from the mean of the NoComm condition are marked with an asterisk.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 6.2

Summary of Analyses Testing Main Effect Hypotheses

Hypothesis Tested	Outcome Variable	Conditions Compared	Wald test result	Conclusion
H7a	Perceived 5-year breast cancer risk as a frequency out of 100	BCNoEx vs. BCEx	$F(1, 1100) = 4.26, p = .04$	BCNoEx > BCEx, No support for H7a (wrong direction)
		BCEx vs. BCExRem	$F(1, 1100) = 0.65, p = .42$	BCEx \approx BCExRem, No support for H7a
	Perceived lifetime risk of breast cancer as a frequency out of 100	BCNoEx vs. BCEx	$F(1, 1100) = 0.14, p = .71$	BCNoEx \approx BCEx, No support for H7a
		BCEx vs. BCExRem	$F(1, 1100) = 0.02, p = .89$	BCEx \approx BCExRem, No support for H7a
	Perceived 5-year breast cancer risk as a percentage	BCNoEx vs. BCEx	$F(1, 1094) = 0.06, p = .81$	BCNoEx \approx BCEx, No support for H7a
		BCEx vs. BCExRem	$F(1, 1094) = 0.53, p = .47$	BCEx \approx BCExRem, No support for H7a
Perceived lifetime risk of breast cancer as a percentage	BCNoEx vs. BCEx	$F(1, 1095) = 0.07, p = .79$	BCNoEx \approx BCEx, No support for H7a	
	BCEx vs. BCExRem	$F(1, 1095) = 0.27, p = .61$	BCEx \approx BCExRem, No support for H7a	
H7b	Perceived risk of having a positive	BCNoEx vs. BCEx	$F(1, 1098) = 1.03, p = .31$	BCNoEx \approx BCEx, No support for H7b

	mammogram as a frequency out of 100	BCEx vs. BCExRem	$F(1, 1098) = 2.07, p = .15$	BCEx \approx BCExRem, No support for H7b
	Perceived risk of having a positive mammogram as a percentage	BCNoEx vs. BCEx	$F(1, 1096) = 2.16, p = .14$	BCNoEx \approx BCEx, No support for H7b
		BCEx vs. BCExRem	$F(1, 1096) = 3.36, p = .07$	BCEx \approx BCExRem, No support for H7b
H7c	Perceived risk of having a false-positive mammogram as a frequency out of 100	FPNoEx vs. FPEx	$F(1, 1098) = 0.83, p = .36$	FPNoEx \approx FPEx, No support for H7c
		FPEx vs. FPExRem	$F(1, 1098) = 3.09, p = .08$	FPEx \approx FPExRem, No support for H7c
	Perceived risk of having a false-positive mammogram as a percentage	FPNoEx vs. FPEx	$F(1, 1098) = 0.31, p = .58$	FPNoEx \approx FPEx, No support for H7c
		FPEx vs. FPExRem	$F(1, 1098) = 3.32, p = .07$	FPEx \approx FPExRem, No support for H7c

Note. Conditions are as follows: FPNoEx = false-positive comments without exemplars, BCNoEx = mammogram-detected breast cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected breast cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected breast cancer comments with exemplars removed.

I used OLS regression to examine the effects of condition on each of the four measures of perceived risk of breast cancer.¹³ Hypothesis 7a predicted that the presence of comments with mammogram-detected cancer exemplars would be associated with increased perceived breast cancer risk when compared to the presence of mammogram-detected cancer comments without exemplars (i.e., nonexemplar comments of the same valence and topic).

Perceived 5-year risk of breast cancer as a frequency. Mean perceived risk of developing breast cancer in the next five years, when risk was measured as a frequency out of 100, is shown in Figure 6.3. The overall F test for the regression was significant ($F(7, 1100) = 2.78, p = .007$), with NoInfo, BCNoEx, and BCExRem being significantly higher than NoComm ($p = .001, p < .001$, and $p = .015$, respectively). Planned Wald tests following the regression show that perceived risk in BCNoEx was significantly higher than in BCEx, $F(1, 1100) = 4.26, p = .04$, contrary to H7a. This effect was moderated by history of a prior mammogram; such that the difference between BCEx and BCNoEx was not significant for women who had had a prior mammogram (the interaction between condition and mammography history in an ANOVA was significant, $F(1, 255) = 4.22, p = .04$; see Figure 6.4). BCEx was not significantly different from BCExRem (see Table 6.2). Hypothesis 7a was not supported for this measure of perceived breast cancer risk.

¹³ I repeated the analyses described below with an aggregated measure of risk that combined the four measures of perceived risk of breast cancer. There was no effect of exemplars when these measures were combined.

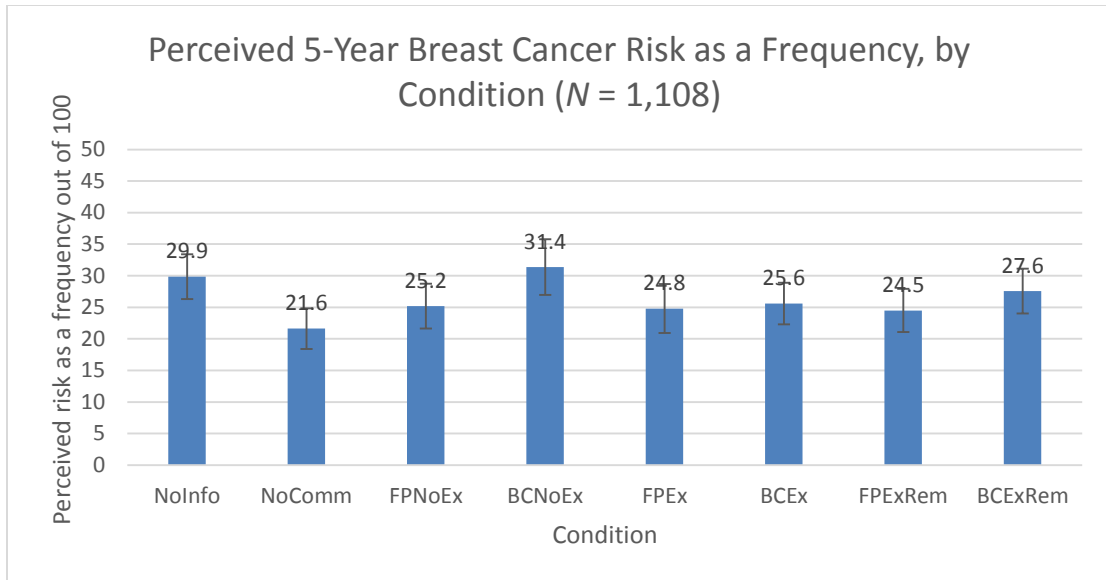


Figure 6.3. Mean perceived risk of having breast cancer in the next five years when risk was measured as a frequency out of 100, by condition. Error bars indicate \pm SE.

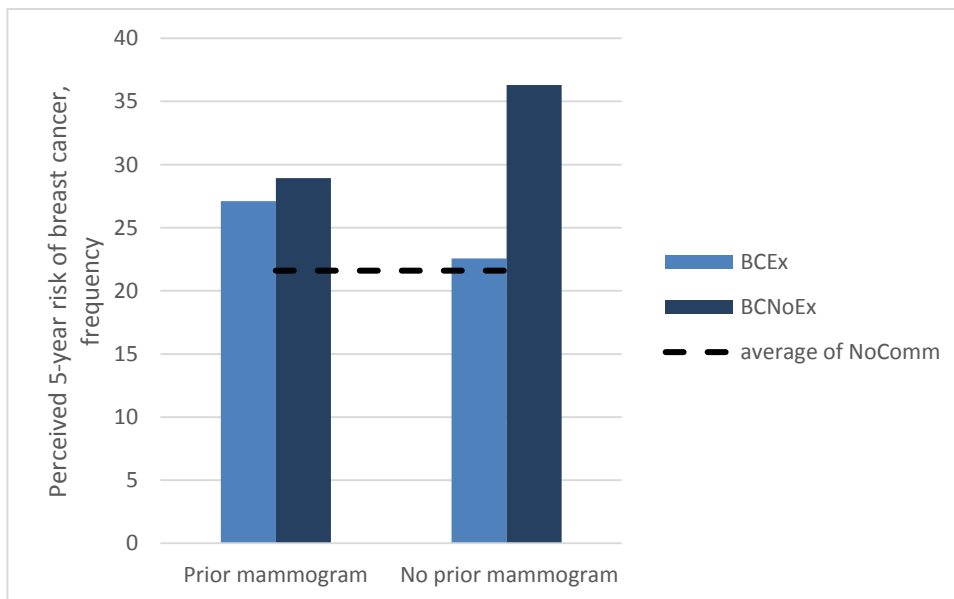


Figure 6.4. Representation of moderating effect of history of prior mammogram on relationship between exemplars and perceived 5-year risk of breast cancer measured as a frequency.

Exploratory Wald tests show that, collectively, BCNoEx, BCEx, and BCExRem had significantly higher perceived 5-year risk of breast cancer as a frequency than combined conditions FPNoEx, FPEx, and FPExRem, $F(1, 1100) = 4.74, p = .030$. Means for each combined group of conditions and the control conditions are shown in Figure 6.5. In addition to the significant difference between all false-positive conditions and all mammogram-detected breast cancer conditions, the NoInfo control condition was significantly higher than the NoComm control condition ($F(1,1100) = 11.32, p < .001$) and all false positive conditions combined ($F(1, 1100) = 5.75, p = .017$), and all breast cancer conditions combined were significantly higher than the NoComm control ($F(1,1100) = 10.89, p = .001$). When each exemplar condition was compared to the combined nonexemplar conditions of the same valence (BCEx vs. BCNoEx and BCExRem combined; FPEx vs. FPNoEx and FPExRem combined), there were no significant effects of exemplars on perceived 5-year breast cancer risk measured as a frequency.

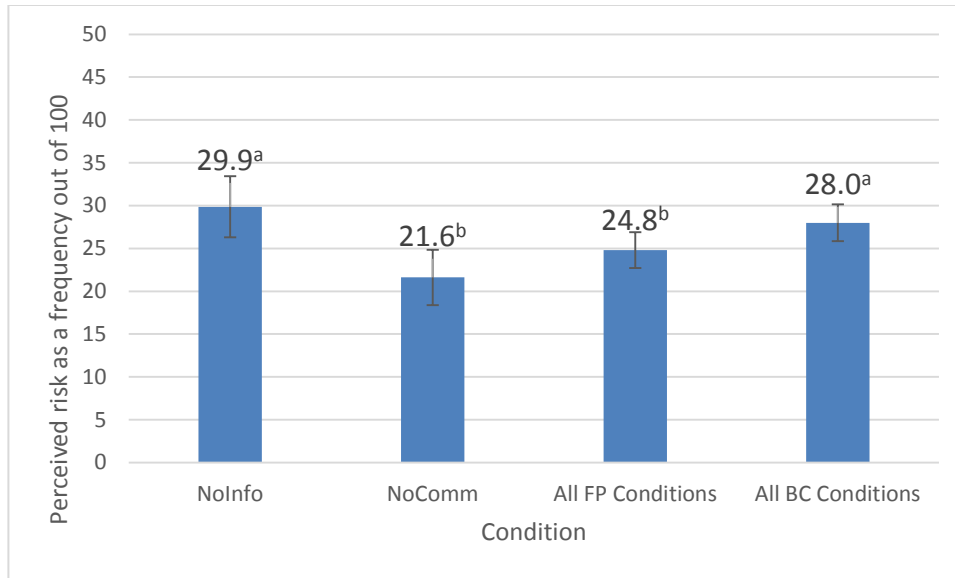


Figure 6.5. Mean perceived 5-year risk of breast cancer (measured as a frequency) across control conditions and conditions combined by topic/valence. Error bars indicate \pm SE. Means sharing the same superscript are not significantly different from each other (F test, $p < .05$).

Perceived lifetime risk of breast cancer as a frequency. The mean perceived risk of developing breast cancer in one's lifetime, measured as a frequency out of 100, is presented in Figure 6.6. The pattern is similar to 5-year risk: the overall regression is significant, $F(7, 1100) = 4.17, p < .001$, and NoInfo, BCNoEx, BCEx, and BCExRem are significantly higher than NoComm ($p < .001, p = .015, p = .043$, and $p = .027$, respectively). Planned Wald tests show that BCEx did not differ significantly from either BCNoEx or BCExRem, so Hypothesis 7a was not supported for this measure of perceived breast cancer risk (see Table 6.2).

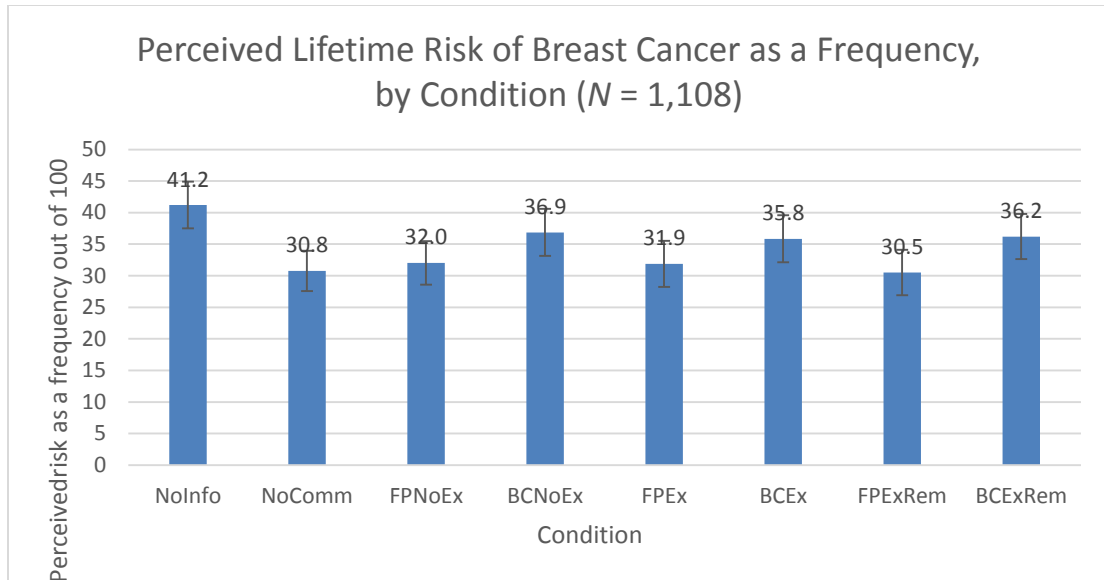


Figure 6.6. Mean perceived risk of having breast cancer in one's lifetime when risk was measured as a frequency out of 100, by condition. Error bars indicate \pm SE.

Exploratory analyses again showed that, collectively, BCNoEx, BCEX, and BCEXRem had significantly higher perceived risk for this measure than FPNoEx, FPEX, and FPEXRem, $F(1, 1100) = 10.24, p = .001$. Means for each set of combined conditions and each control group are shown in Figure 6.7. In addition to the significant difference between all mammogram-detected breast cancer conditions and all false-positive conditions, mean perceived risk in the all BC conditions was higher than the NoComm control ($F(1, 1100) = 7.95, p = .005$), and the NoInfo control was higher than the NoComm control ($F(1, 1100) = 17.46, p < .001$), all FP conditions combined ($F(1, 1100) = 20.30, p < .001$), and all BC conditions combined ($F(1, 1100) = 5.07, p = .025$). When each exemplar condition was compared to the combined nonexemplar conditions of the same valence (BCEX vs. BCNoEx and BCEXRem combined; FPEX vs. FPNoEx

and FPEXRem combined), there were no significant effects of exemplars on perceived lifetime breast cancer risk measured as a frequency.

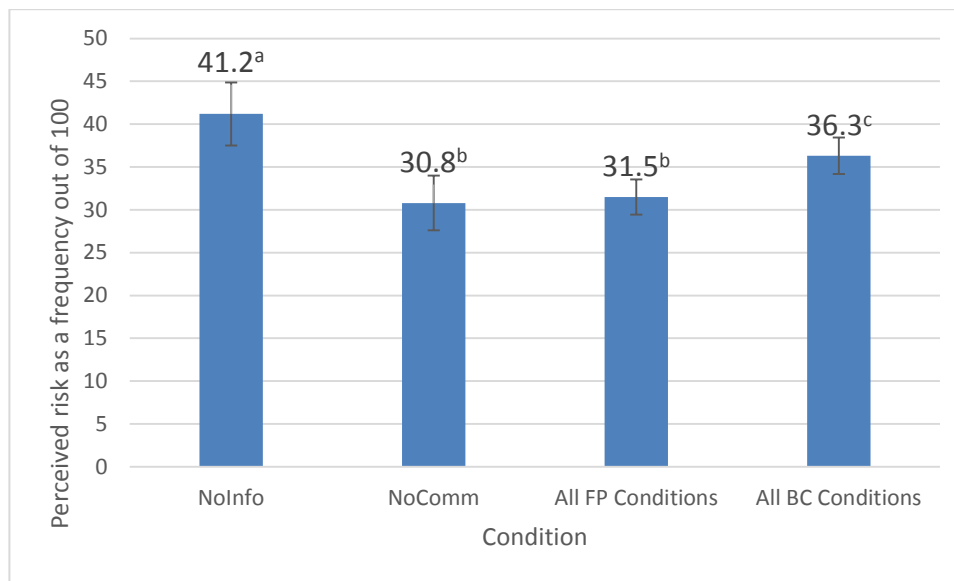


Figure 6.7. Mean perceived lifetime risk of breast cancer (measured as a frequency) across control conditions and conditions combined by topic/valence. Error bars indicate \pm SE. Means sharing the same superscript are not significantly different from each other (F test, $p < .05$).

Perceived 5-year risk of breast cancer as a percentage. Figure 6.8 displays mean perceived risk of developing breast cancer in the next five years across conditions, with risk being measured as a percentage. The overall regression was not significant, $F(7, 1094) = 1.39, p = .21$. Planned Wald tests show that BCEX did not differ significantly from either BCNoEx or BCEXRem, so Hypothesis 7a was not supported for this measure of perceived breast cancer risk (see Table 6.2). However, there was a significant moderating effect of prior history of a mammogram, such that the predicted difference between BCEX and BCNoEx emerged for women who had had a mammogram (the

interaction between condition and mammography history in an ANOVA was significant, $F(1, 255) = 4.91, p = .03$; see Figure 6.9). There was also a moderating effect of family history of breast cancer; for women with a family history, BCEx led to higher perceived risk than BCExRem (in an ANOVA, the interaction between condition and family history was significant, $F(1, 270) = 10.74, p = .001$; see Figure 6.10). Finally, there was a moderating effect of education on the relationship between exemplars and risk perceptions, such that BCExRem led to lower perceived risk than BCEx for the most highly educated but higher perceived risk for participants with lower levels of education (in an ANOVA, the interaction between condition and education recoded as a continuous measure was significant, $F(1, 270) = 5.59, p = .02$; see Figure 6.11). Exploratory analyses showed that there were no significant differences when all mammogram-detected breast cancer comment conditions were compared to conditions with false-positive mammogram comments or when exemplar conditions were compared to corresponding combined nonexemplar conditions (BCEx vs. BCNoEx and BCExRem combined; FPEx vs. FPNoEx and FPExRem combined). Thus, there were not effects of topic or presence of exemplars.

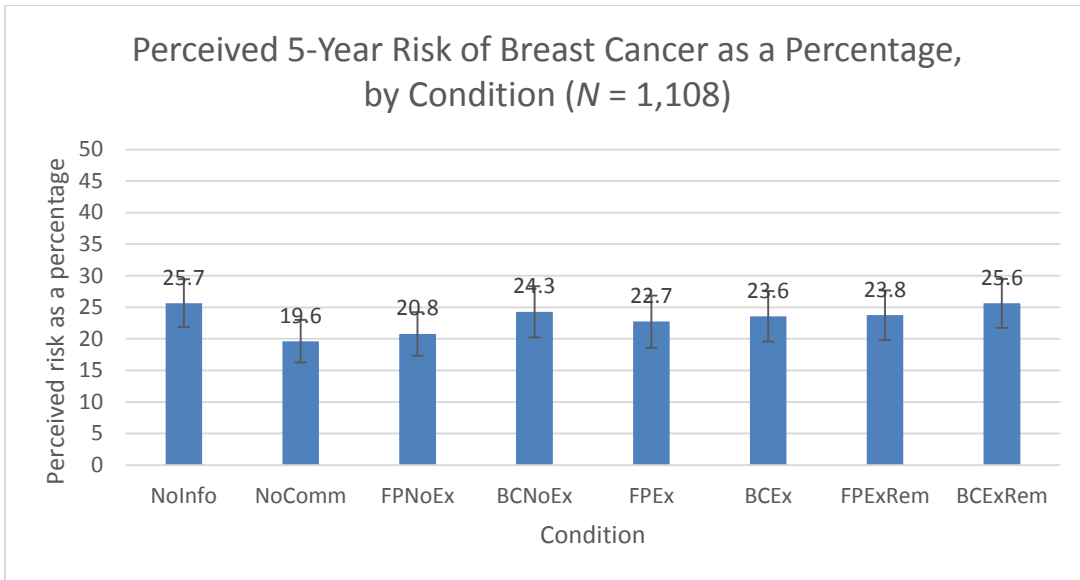


Figure 6.8. Mean perceived risk of having breast cancer in the next five years when risk was measured as a percentage, by condition. Error bars indicate \pm SE.

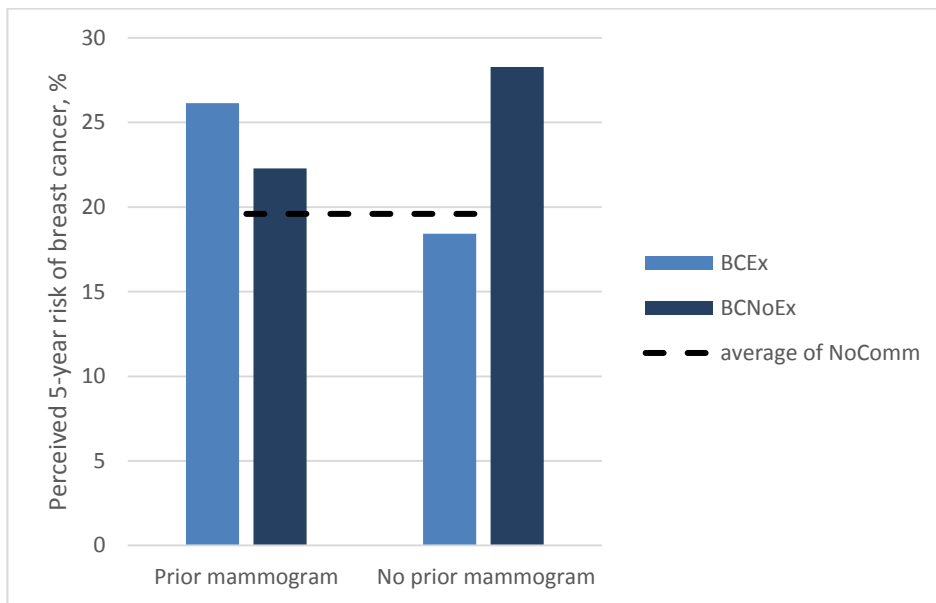


Figure 6.9. Representation of the effect of BCEX (vs. BCNoEx) on perceived 5-year risk of developing breast cancer, as moderated by prior history of mammogram.

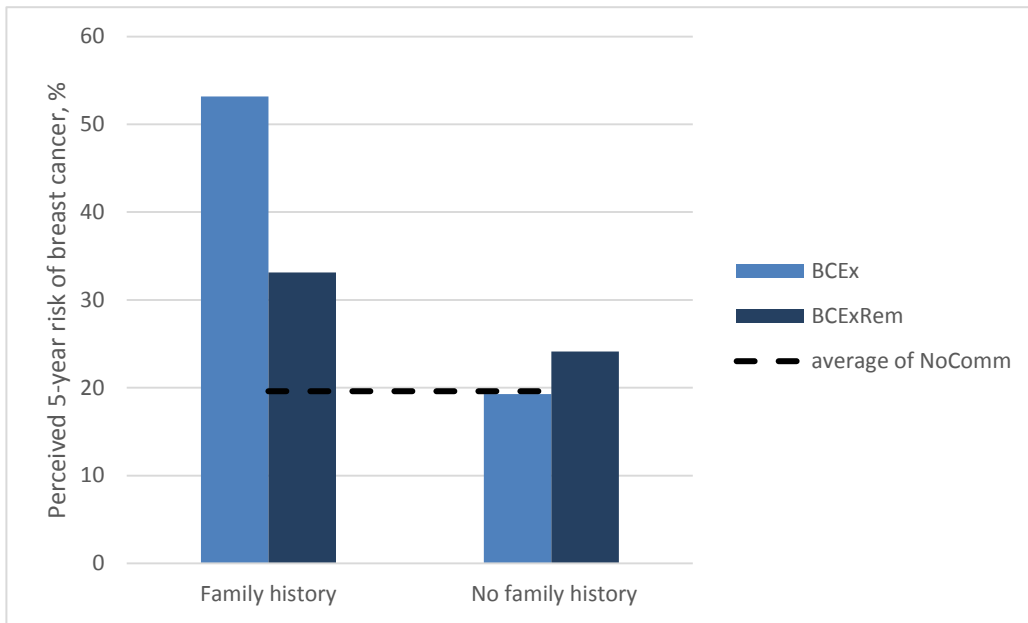


Figure 6.10. Representation of the effect of BCEX (vs. BCEXRem) on perceived 5-year risk of developing breast cancer, as moderated by family history of breast cancer.

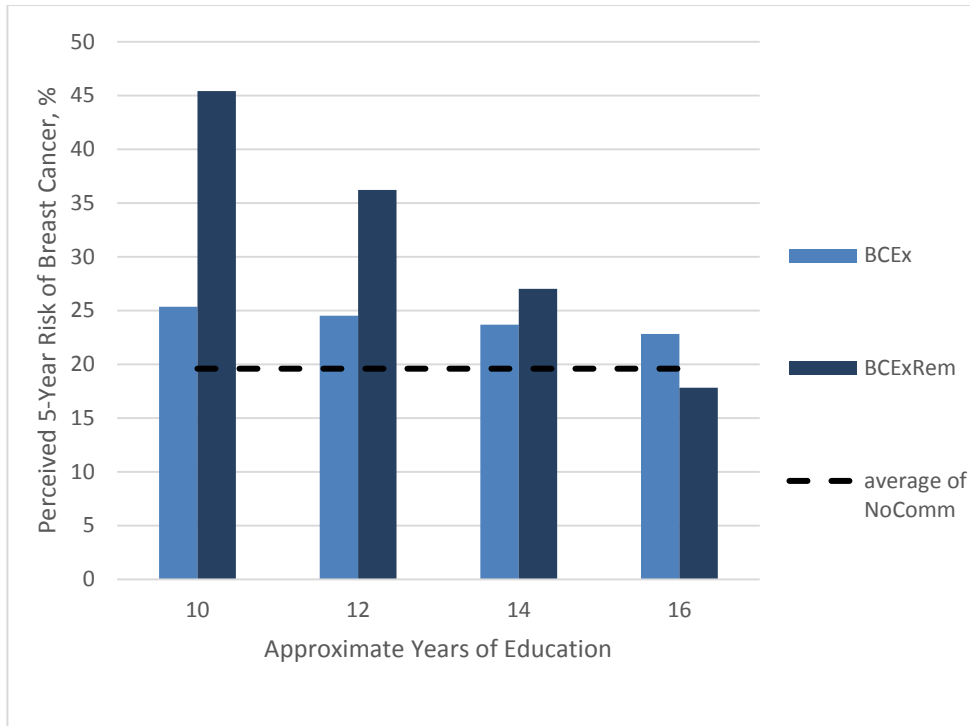


Figure 6.11. Representation of the effect of BCEx (vs. BCExRem) on perceived 5-year risk of developing breast cancer, as moderated by education. Note that 39.8% of the sample had at least a college degree, while only 2.3% had less than a high school degree, so estimates may be unstable for low levels of education.

Perceived lifetime risk of breast cancer as a percentage. Mean perceived lifetime breast cancer risk, measured as a percentage, is presented in Figure 6.12. The overall regression was not significant, $F(7, 1095) = 1.48, p = .17$. BCEx did not differ significantly from either BCNoEx or BCExRem, so Hypothesis 7a was not supported for this measure of perceived breast cancer risk (see Table 6.2). However, there was a significant moderating effect of family history of breast cancer; as with perceived 5-year risk, for women with a family history, BCEx led to higher perceived risk than BCExRem

(in an ANOVA, the interaction between condition and family history of breast cancer was significant, $F(1, 270) = 6.49, p = .01$; see Figure 6.13). Exploratory analyses showed that there were no significant differences when all mammogram-detected breast cancer comment conditions were compared to conditions with false-positive mammogram comments or when exemplar conditions were compared to corresponding combined nonexemplar conditions (BCEx vs. BCNoEx and BCExRem combined; FPEx vs. FPNNoEx and FPExRem combined). Thus, there was no evidence of an effect of topic or presence of exemplars.

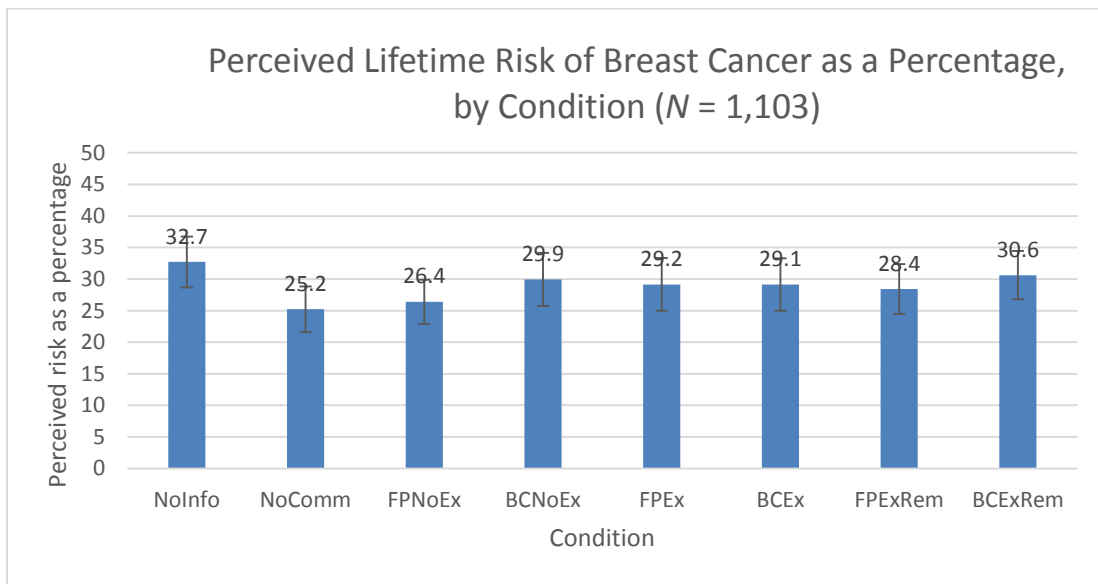


Figure 6.12. Mean perceived risk of having breast cancer in one’s lifetime when risk was measured as a percentage, by condition. Error bars indicate \pm SE.

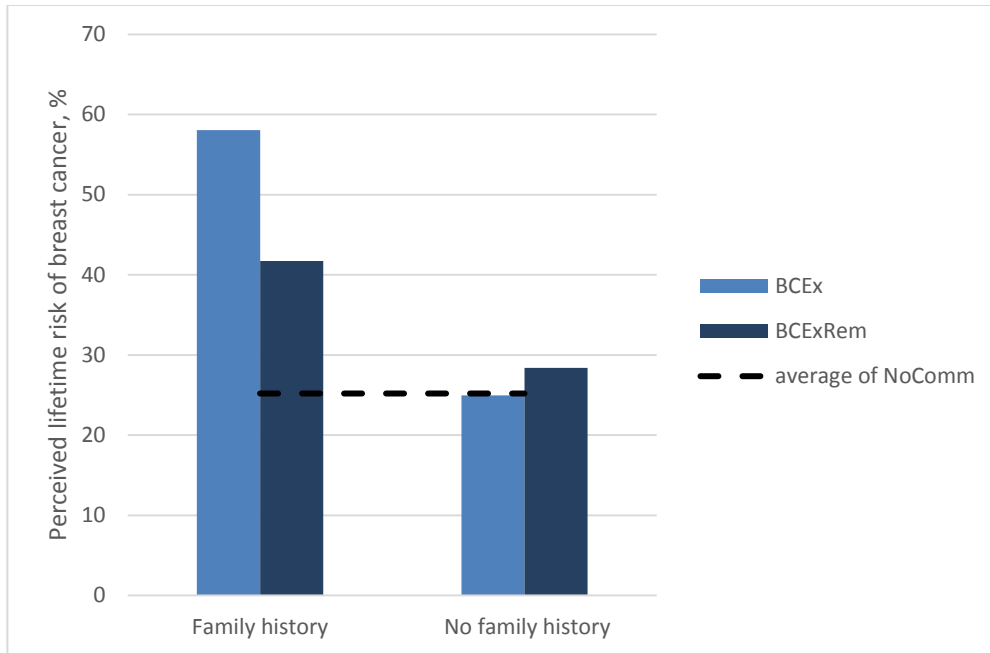


Figure 6.13. Representation of the effect of BCEX (vs. BCEXRem) on perceived lifetime risk of developing breast cancer, as moderated by family history of breast cancer.

Perceived risk of positive mammogram. Perceived risk of experiencing a positive mammogram was measured both as a frequency out of 100 and as a percentage, and the means are presented in Figure 6.14 and Figure 6.15, respectively.¹⁴ Hypothesis 7b predicted that the presence of comments with mammogram-detected cancer exemplars would be associated with increased perceived risk of a positive mammogram when compared to the presence of mammogram-detected cancer comments without exemplars.

¹⁴ I repeated the analyses with a combined measure of risk of a positive mammogram, but the pattern of results is the same as for the individual measures.

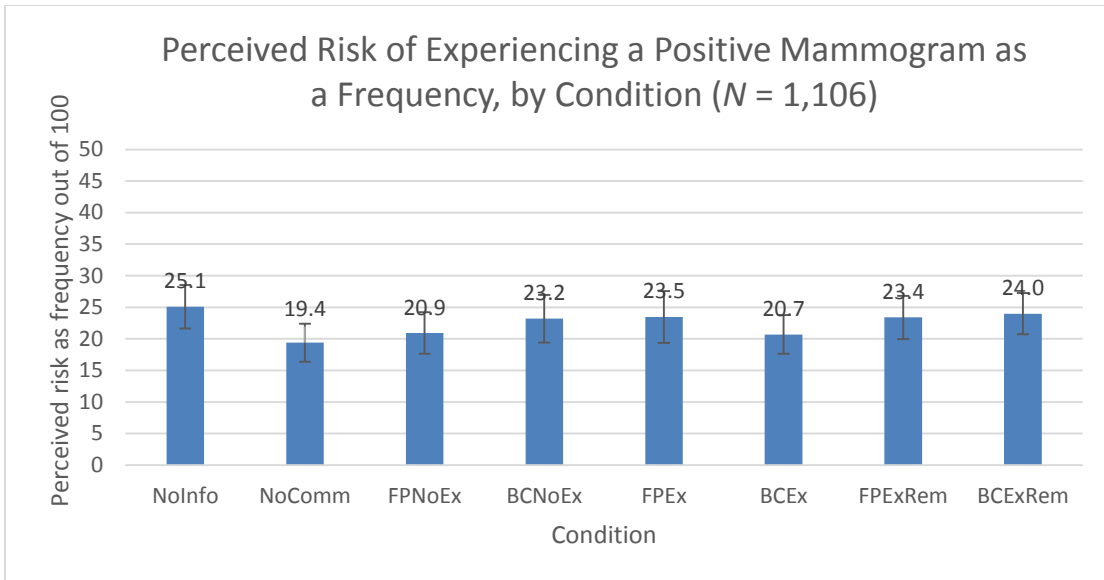


Figure 6.14. Mean perceived risk of experiencing a positive mammogram, measured as a frequency out of 100, by condition.

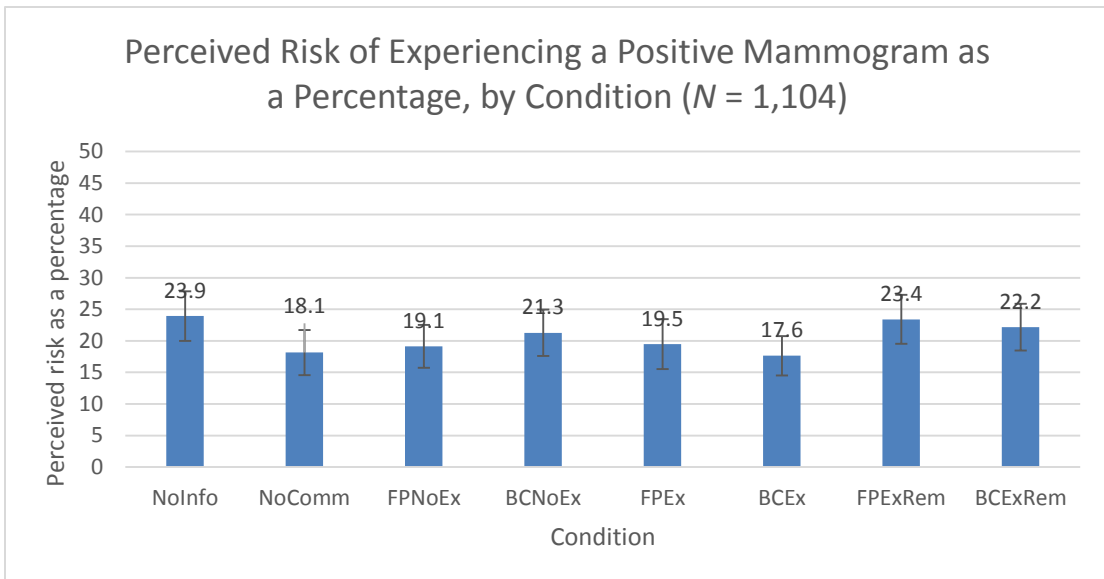


Figure 6.15. Mean perceived risk of experiencing a positive mammogram, measured as a percentage, by condition.

When perceived risk of experiencing a positive mammogram was measured as a frequency, the overall regression comparing each condition to NoComm was not significant, $F(7, 1098) = 1.39, p = .21$. Planned contrasts (using Wald tests) show that BCEx did not differ significantly from BCNoEx or BCExRem (see Table 6.2). However, there was a significant moderating effect of family history of breast cancer, such that the expected effect did appear for women with a family history (in a factorial ANOVA, the interaction between condition (BCEx vs. BCExRem) and family history (no family history of breast cancer vs. at least one first degree relative with breast cancer) was significant, $F(1, 270) = 4.66, p = .03$; see Figure 6.16). There was also a moderating effect of education, and the predicted effect was only present for the most highly educated; in an ANOVA, the interaction between condition (BCNoEx vs. BCEx) and education, recoded as a continuous variable, was significant, $F(1, 254) = 4.55, p = .03$. As levels of education decreased, BCNoEx led to higher levels of perceived risk than BCEx (see Figure 6.17).

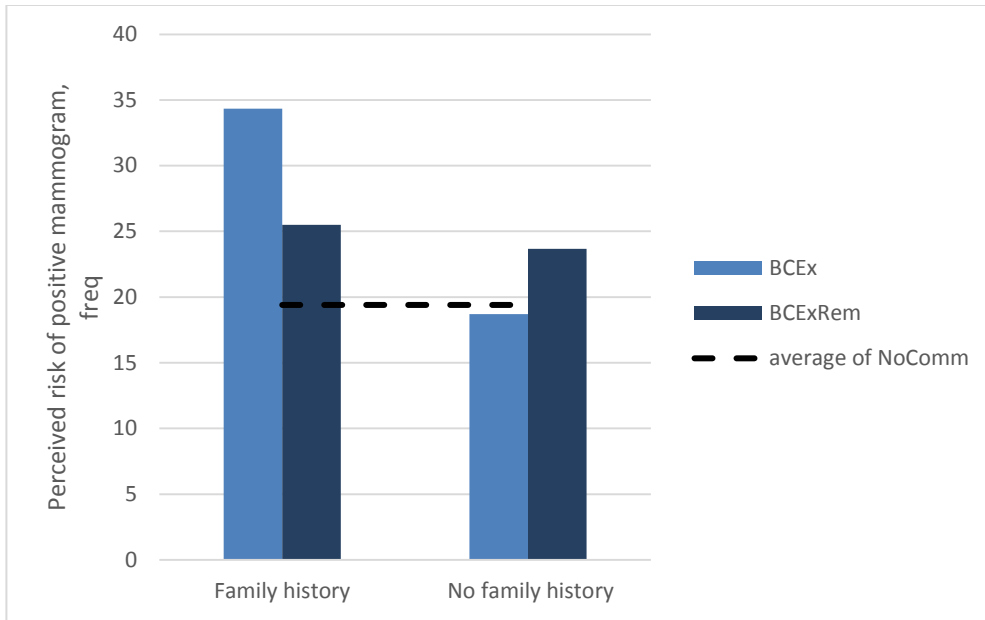


Figure 6.16. Representation of the effect of BCEX (vs. BCEXRem) on perceived risk of having a positive mammogram, as moderated by family history of breast cancer.

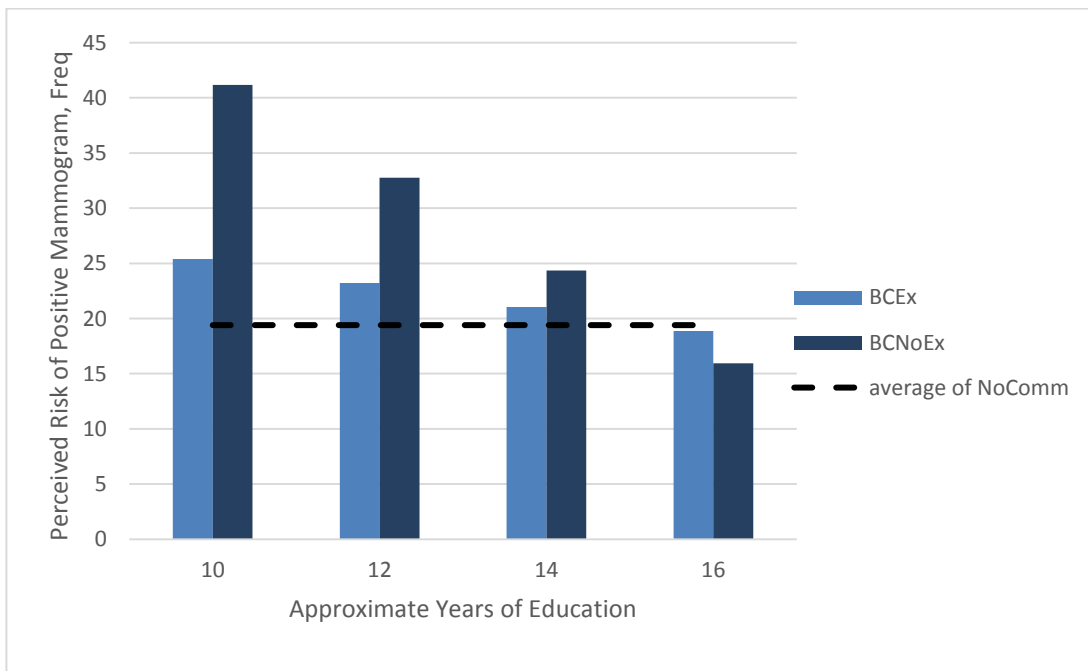


Figure 6.17. Representation of the effect of BCEx (vs. BCNoEx) on perceived risk of having a positive mammogram, as moderated by level of education.

When perceived risk of having a positive mammogram was measured as a percentage, the overall regression was not significant, $F(7, 1096) = 1.68, p = .11$, and planned contrasts show that BCEx did not differ significantly from BCNoEx or BCExRem (see Table 6.2). Hypothesis 7b was not supported. However, there was an unexpected moderating effect of history of prior mammogram; in a factorial ANOVA, the interaction between condition (BCEx vs. BCNoEx) and history of mammogram was significant, $F(1, 254) = 5.86, p = .02$. There was no substantial difference between the BCEx and BCNoEx condition for women with a prior mammogram, but, for women who had not had a prior mammogram, the BCNoEx condition led to higher perceived risk of a positive mammogram (see Figure 6.18).

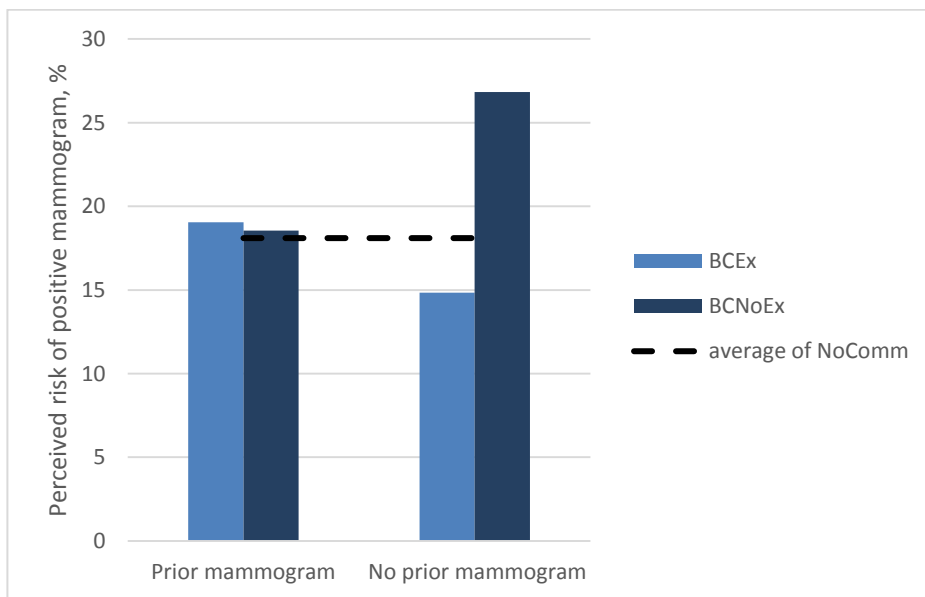


Figure 6.18. Representation of the effect of BCEx (vs. BCNoEx) on perceived risk of having a positive mammogram, as moderated by history of prior mammogram.

Exploratory analyses showed that there were no significant differences when all mammogram-detected breast cancer comment conditions were compared to conditions with false-positive mammogram comments or when the mammogram-detected cancer exemplar condition was compared to combined cancer nonexemplar conditions (BCEx vs. BCNoEx and BCExRem combined). Thus, there were no effects of topic or presence of exemplars on this measure of perceived risk.

Perceived risk of a false-positive mammogram. Like the other risk constructs, perceived risk of having a false-positive mammogram was measured as both a frequency out of 100 and a percentage.¹⁵ Means by condition when risk was measured as a frequency are presented in Figure 6.19. Means by condition when risk was measured as a percentage are presented in Figure 6.20. Hypothesis 7c predicted that the presence of comments with false-positive exemplars would increase perceived risk of experiencing a false-positive when compared to the presence of false-positive comments without exemplars.

¹⁵ I repeated these analyses using a combined measure of risk of a false positive, but there was still no significant effect of exemplars on perceived risk.

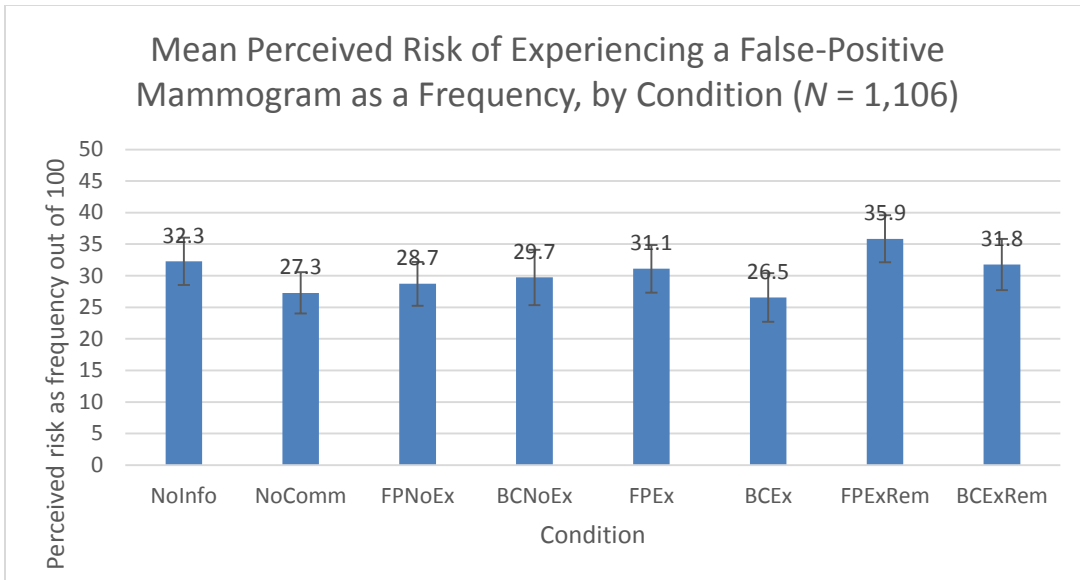


Figure 6.19. Mean perceived risk of experiencing a false-positive mammogram, measured as a frequency out of 100, by condition.

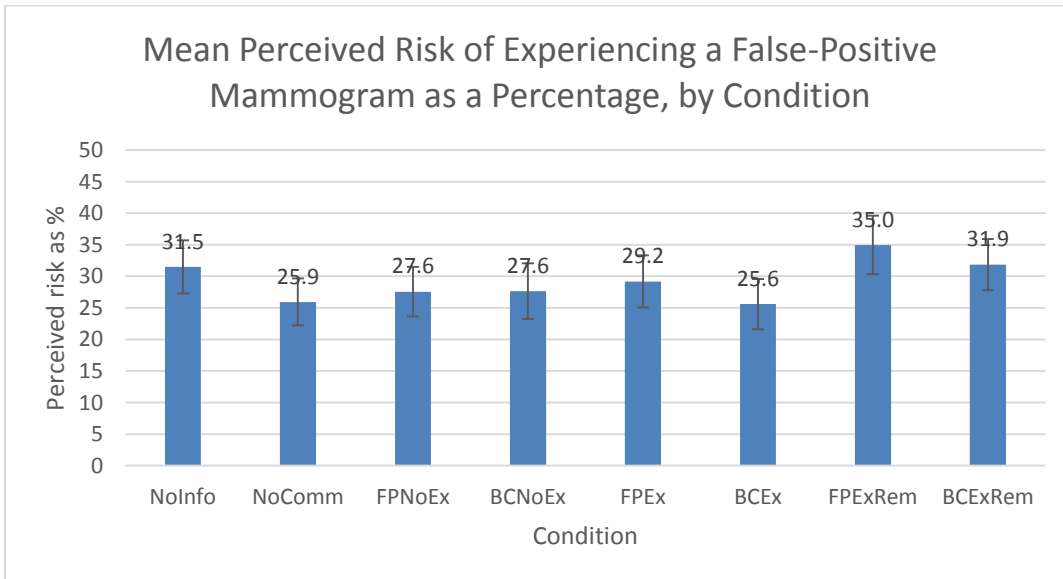


Figure 6.20. Mean perceived risk of experiencing a false-positive mammogram, measured as a percentage, by condition.

When perceived risk of having a false positive was measured as a frequency out of 100, the regression was significant, $F(7, 1098) = 2.59, p = .01$, and NoInfo and FPEXRem had significantly higher average perceived risks than NoComm ($p = .048$ and $p = .001$, respectively). Planned Wald tests show that FPEX was not significantly different from FPNoEx or FPEXRem (see Table 6.2). However, for participants with a higher reading time (compared to those with a reading time that was less than half the median time for participants in their condition), the FPEXRem condition led to higher perceived risk of a false positive than the FPEX condition. In a factorial ANOVA, the interaction between condition [FPEX vs. FPEXRem] and a dichotomous measure of reading time was significant, $F(1, 257) = 6.16, p = .01$; see Figure G1 in Appendix G. When perceived risk of a false positive was measured as a percentage, the regression was significant, $F(7, 1098) = 2.59, p = .01$, and FPEXRem and BCEXRem had significantly higher average perceived risks than NoComm ($p = .003$ and $p = .035$). Again, FPEX was not significantly different from FPNoEx or FPEXRem (see Table 6.2), but there was again a moderating effect of reading time. In a factorial ANOVA, the interaction between condition [FPEX vs. FPEXRem] and a dichotomous measure of reading time was significant, $F(1, 257) = 4.47, p = .04$; see Figure G2 in Appendix G. Hypothesis 7c was not supported for either measure of perceived risk of a false-positive mammogram.

Exploratory analyses showed that there were no significant differences when all mammogram-detected breast cancer comment conditions were compared to conditions with false-positive mammogram comments or when both false-positive nonexemplar

conditions were compared to the false-positive exemplar condition (FPEX vs. FPNoEx and FPEXRem combined) for either measure of perceived risk of a false-positive mammogram.

Mediators of Effects of Comments on Perceived Risk

I used mediation analysis to test Hypotheses 8a, 8b, 8c, and 9. A summary of the results of formal tests of indirect effects for each proposed mediator are presented in the sections that follow. Full details of these results are available in Appendix F.

Negative affect. Negative affect was the primary proposed mediator of effects of exemplars on risk perceptions. Negative affect by condition is shown in Figure 6.21; FPEX was the only individual condition to lead to a significant increase in negative affect. However, when all false positive comment conditions (FPNoEx, FPEX, and FPEXRem) were combined and all breast cancer comment conditions (BCNoEx, BCEX, and BCEXRem) were combined, each set led to significantly higher negative affect than the NoComm condition (see Figure 6.22). There was no significant effect of exemplars on negative affect (regardless of whether each exemplar condition was compared to its corresponding individual nonexemplar conditions or combined nonexemplar conditions) or of comment topic/valence on negative affect. Though greater negative affect was consistently significantly associated with an increase in perceived risk of breast cancer (path coefficients in mediation models ranged from 4.38 [$p = .006$] to 12.28 [$p < .001$]), regardless of how risk was measured, there was no effect of condition on perceived risk of breast cancer and no indirect effects through negative affect (see Tables F8 through F11). Greater negative affect was also significantly associated with an increase in

perceived risk of a positive mammogram (path coefficients in mediation models ranged from 5.93 to 10.26, both $p < .001$; see Tables F12 and F13) and perceived risk of having a false-positive mammogram (path coefficients in mediation models ranged from 2.48 [not significant] to 7.85 [$p < .001$]; see Tables F14 and F15). However, as with perceived risk of breast cancer, there were no indirect effects of exemplars on positive mammogram or false-positive mammogram risk perceptions through negative affect. Due to the lack of indirect effects, there was no support for **H8a**, **H8b**, or **H8c**.

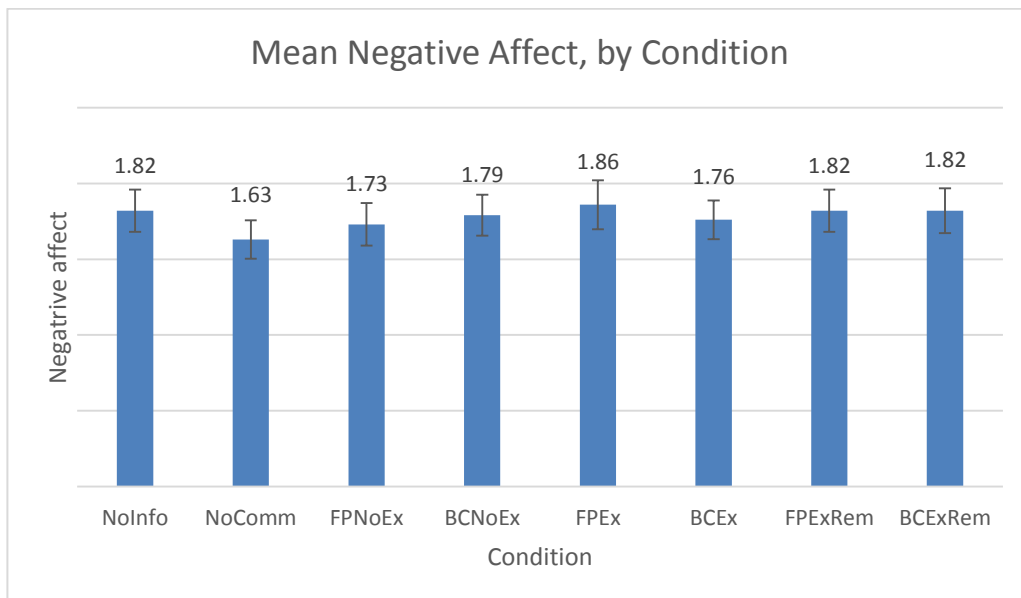


Figure 6.21. Mean negative affect, by condition. Negative affect was measured using the 10-item negative affect scale from the Positive Affect Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Responses for each item ranged from 1 to 5 (*very slightly or not at all/a little/moderately/quite a bit/extremely*) and the ten items were averaged to form the scale.

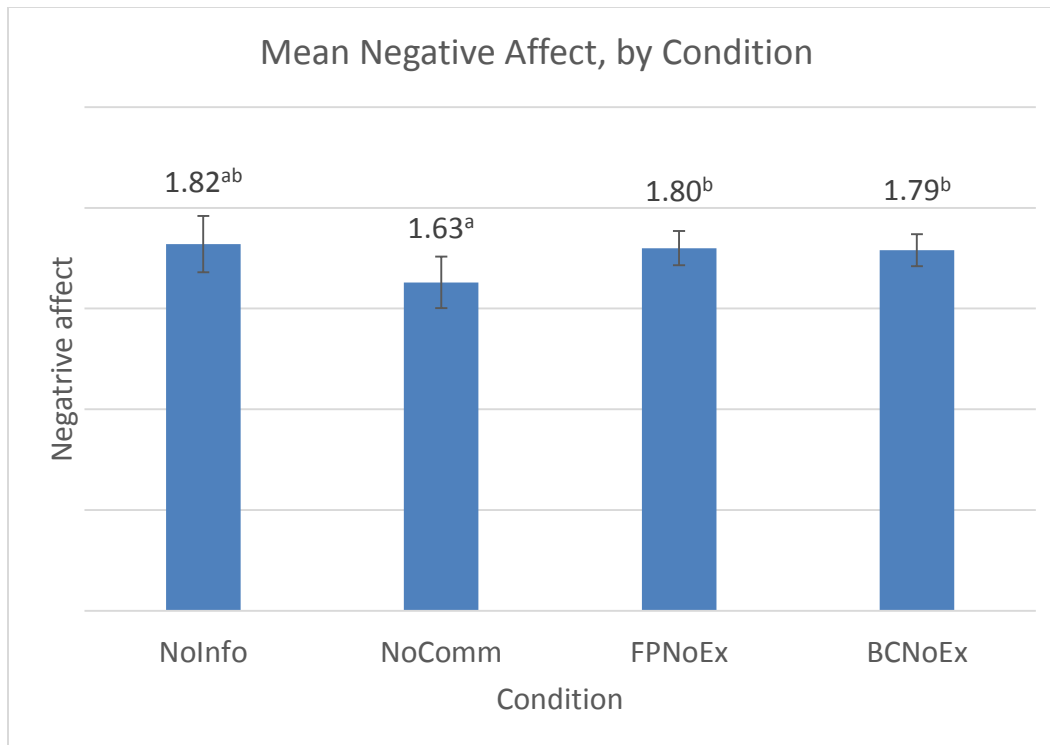


Figure 6.22. Mean negative affect, by control conditions and conditions combined by topic/valence. Negative affect was measured using the 10-item negative affect scale from the Positive Affect Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Responses for each item ranged from 1 to 5 (*very slightly or not at all/a little/moderately/quite a bit/extremely*) and the ten items were averaged to form the scale. Groups that share a superscript are not significantly different from each other ($p < .05$).

Perceived risk as a mediator. I also conducted a mediation analyses using OLS path analysis to test the role of perceived risk of breast cancer as a mediator of the effect of exemplars on intentions to have a mammogram in the next two years. Although perceived risk of breast cancer (measured as a percentage) was consistently significantly related to increased intentions to have a mammogram in the next two years (see Tables

F18 and F19), there were no consistent effects of exemplars on risk (regardless of how risk was measured). There were also no significant indirect effects of exemplars on intentions through risk perceptions, thus **H9** was not supported.

Exploratory analyses. In addition to the hypothesis-driven mediation analyses reported above, I also performed exploratory mediation analyses to attempt to explain the effect of comment topic/valence on risk perceptions. Of the variables tested (including narrative transportation, attitudes, norms, self-efficacy, and affect), none significantly mediated the effects.

Discussion

This study investigates the impact of mammography news commentary on risk perceptions, including perceived risk of contracting breast cancer, perceived risk of having a positive mammogram, and perceived risk of having a false-positive mammogram. It also investigates the mechanisms underlying these effects, including moderating effects of education, family history of breast cancer, history of prior mammogram, and time spent with the experimental manipulation and mediating effects of negative affect.

Effects of Comment Topic

Though there was no evidence of a positive effect of presence of exemplars on perceived risk, I did observe an effect of comment topic on breast cancer risk perceptions that was not hypothesized. For both five-year breast cancer risk measured as a frequency and lifetime breast cancer risk measured as a frequency, BCNoEx, BCEx, and BCExRem

had significantly higher perceived risk of breast cancer than FPNoEx, FPEX, and FPEXRem.

While the effects of comment topic (false-positive mammograms vs. mammogram-detected cancer) on mammography intention reported in Chapter 5 were predicted and may be explained by the difference in valence, the effects of topic on risk perceptions reported in this chapter were unexpected and not as easily explained by valence. Instead, I propose that the effects of topic on risk perceptions were due to their differences in content and might be explained by the availability heuristic (Tversky & Kahneman, 1982). According to Tversky and Kahneman, “a person is said to employ the availability heuristic whenever he estimates frequency or probability by the ease with which instances or associations could be brought to mind” (1982, p. 164). It is plausible that those who read comments about mammogram-detected breast cancer had higher breast cancer risk perceptions than those who read about false positives because they could more easily recall instances of others discussing having been diagnosed with breast cancer. Comments about mammogram-detected cancer may have also been more accessible due to being more believable, familiar, or higher in perceived argument strength than false-positive comments. These possible mechanisms of action should be explored through future research.

Effect of Exemplars in Comments

Results of tests of hypotheses 7a, 7b, and 7c (main effects of exemplars on risk perceptions) are presented in Table 6.2. In this experiment, there is no evidence that exemplars increase breast cancer risk perceptions, thus **H7a** was not supported. In fact,

there was one test that showed exemplars decreased risk perceptions, contrary to my hypothesis; when perceived risk of developing breast cancer in the next five years was measured as a frequency, the mammogram-detected cancer comments condition with exemplars led to a lower perceived risk than the condition without exemplars. There is also no evidence that the presence of exemplars affects perceived risk of have a positive mammogram or perceived risk of having a false positive, meaning there is also no support for **H7b** and **H7c**, respectively.

Despite my prediction that exemplar comments would increase risk perceptions over nonexemplar comments because of the availability heuristic, availability may also actually explain why the predicted differences between exemplar and nonexemplar conditions did not emerge for risk perceptions. Sometimes, FPEXRem and BCEXRem even appeared to have higher means when compared to FPEX and BCEX, respectively, though the differences never reached significance. In the FPEXRem and BCEXRem conditions, exemplars were removed from comments by replacing mentions of individual women with “women” or “some women.” It is possible that, though FPEXRem and BCEXRem did not technically contain exemplars according to my relatively narrow operational definition, the comments in these conditions conveyed the idea that many other women were experiencing false positives (FPEXRem) or mammogram-detected breast cancer (BCEXRem). Future research should examine how effects differ with definitions of exemplars that are more or less inclusive. It should also be noted that much of the work on exemplars (e.g., Zillmann, 2006) contrasts exemplars with numeric base-rates and not merely with statements lacking exemplars, as I have. While this

experimental decision was made in an attempt to isolate effects of exemplars, the choice of comparison condition may have contributed to the lack of effects.

As mentioned in Chapter 5, there are several additional reasons why exemplars may have failed to produce the predicted effects. First, participants spent very little time reading the experimentally manipulated comments.¹⁶ Due to the low average time spent on the page of the survey that displayed the experimental manipulation, exposure to the manipulation may have been insufficient to produce effects on the constructs of interest. Though moderation analyses did not show a significant moderation effect of reading time, the study may not have enough power to detect moderation effects. Finally, it is possible that effects of exemplars will only emerge over time, producing a sleeper effect.

Effect of Presence of Comments

As mentioned in Chapter 5, these findings are consistent with prior research (Shi, Messaris, & Cappella, 2014) that found that the presence of any comments (positive or negative) detracts from the perceived effectiveness of the message. Indeed, the presence of any comments may have had harmful effects on readers in the present research by altering the effects of the news article. Compared to the NoInfo condition, the NoComm condition to decreased breast cancer risk perceptions. Conditions in which participants

¹⁶ As described in Chapter 5, in conditions with comments, median time spent on the comment page ranged from a low of 29 seconds for BCEXRem to a high of 57 seconds for FPEX. The average set of comments in BCEXRem was 398 words, and the average set of comments in FPEX was 584 words. Typical reading speeds in experimental studies involving reading on computer screens (Knoblauch, Ardit, & Szlyk, 1991) and smartphones (Na, Choi, & Suk, 2016) are roughly 300 words per minute. At these speeds, it should take readers an average of 80 seconds to read the comments in BCEXRem and an average of 117 seconds to read the comments in FPEX.

viewed the news story and a set of comments generally increased breast cancer risk perceptions. Because participants who read the article but no comments had the lowest perceived breast cancer risk and women tend to overestimate their breast cancer risk (Hoffman et al., 2010), these women (in the NoComm condition) most likely also had the most accurate risk perceptions.¹⁷ This would mean that any comments (but mammogram-detected breast cancer comments, in particular) further inflated overestimates of risk.

Moderation of Effects

Additionally, I found several moderation effects that were not hypothesized. First, a participant's family history of breast cancer moderates the effect of exemplar conditions on risk perceptions.¹⁸ For women with a family history (approximately 15% of the sample), the BCEx condition led to higher perceived 5-year and lifetime risk of breast cancer compared to the BCExRem condition. The pattern was reversed for women without a family history. Similarly, for women with a family history of breast cancer, the BCEx condition led to increases in perceived risk of a positive mammogram over the BCExRem condition. Again, the pattern was reversed for women without a family history. There was also a moderating effect of history of a prior mammogram; effects of

¹⁷ Based on current incidence rates (National Cancer Institute, 2015), the national average lifetime risk of breast cancer is 12.5%, but the average estimate from women in NoComm was 25.2%. Though this is still an overestimate (especially since women at the highest risk of developing breast cancer were excluded from the study), it is lower than average estimates in any other condition.

¹⁸ Three out of 16 (or 18.8%) of tests examining the interaction between conditions and family history of breast cancer were significant, which is greater than the percentage expected by chance with an alpha level of .05.

exemplar conditions on risk perceptions were closer to the predicted effects for women with a history of prior mammography.¹⁹ Education also had a moderating effect on the relationship between exemplar conditions and risk perceptions. The expected effects of exemplars on breast cancer risk perceptions emerged for the most highly educated participants when BCEx was compared to BCExRem for five-year risk of breast cancer measured as a percentage. An additional two marginally significant interactions showed the same pattern of results. A similar pattern emerged when the dependent variable was perceived risk of a positive mammogram; only one test of the interaction was significant, but the remaining three were in the same direction.²⁰

As is Chapter 5, the moderation effects by family history of breast cancer, history of prior mammography, and education are consistent with predictions of the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1981, 1986a, 1986b). The fact that expected effects of exemplars (BCEx > BCNoEx and BCEx > BCExRem) on risk perceptions emerged for the most highly educated participants is indicative of an effect of greater ability to process the experimental messages. The observed moderation effects of family history of breast cancer and history of a prior mammogram are consistent with the expected effects of greater motivation to attend to messages. As predicted by the ELM,

¹⁹ Three out of 24 (or 12.5%) of tests examining the interaction between conditions and history of a prior mammogram were significant, which is greater than the percentage expected by chance with an alpha level of .05.

²⁰ Across all 24 tests examining the interaction between conditions and education, two (or 8.3%) were significant. This is slightly greater than the percentage expected by chance with an alpha level of .05. Given the additional marginally significant results in the same direction, this appears to represent a consistent pattern of effects.

higher levels of ability and motivation to process messages appear to lead to stronger persuasive effects. The observed moderation effects of reading time on effects of exemplars on perceived risk of a false positive are not as clearly explained by this framework. If longer reading time is an indication of higher attention to the experimental manipulation, then the FPEXRem condition may have conveyed that multiple women had experiences with false positives compared to single examples presented in the FPEX condition (a possibility mentioned above).

Mediation of Effects

This chapter also presented results of mediation tests designed to examine the mechanisms underlying effects of comments on risk perceptions. Though comment conditions, in general, led to elevated levels of negative affect, exemplars did not produce more negative affect than nonexemplar conditions. Thus, there was no evidence of indirect effects of exemplars on risk perceptions through negative affect (as proposed in **H8a, H8b, and H8c**) due to a lack of effects of exemplar conditions. However, negative affect was consistently related to perceived risk of having breast cancer and risk of having a positive mammogram. The role of negative affect in predicting perceived risk of having a false-positive mammogram was not as consistent but was significant when FPEX was compared to FPNoEx. Though the expected path between exemplars, negative affect, and perceived risk was not present, the observed effects are of interest. Compared to the NoComm condition, all comment conditions combined resulted in significantly elevated levels of negative affect. In Chapter 5, I proposed that all comments may have been viewed as exemplars, which would reduce my ability to detect differences between

comment conditions. Narratives (Green, 2006), testimonials (Dunlop, Wakefield, & Kashima, 2008) and breast cancer narratives (McQueen & Kreuter, 2010) are all expected to increase negative affect more than nonnarrative text., so my alternate explanation is supported by the findings regarding the effects of all comments on negative affect.

Perceived breast cancer risk was also positively associated with intention in many cases, particularly when risk was measured as a percentage. However, there was no evidence of indirect effects of exemplars on mammography intentions through perceived breast cancer risk (proposed in **H9**) due to a lack of effects of condition on perceived risk. Alternate explanations for the lack of effects on perceived risk are discussed above.

Limitations

As detailed in Chapter 5, the experiment that provided the data for this analysis has several important limitations, including limitations related to experimental design, data collection, and generalizability. First, my ability to find effects may have been limited by my definition of exemplars and subsequent choice of comparison conditions. Though I defined an exemplar as a mention of an individual in a comment, definitions vary widely, and one conceptualization refers to exemplars as “short quotations...from concerned or interested people that illustrate a particular problem or a particular view” (Brosius, 1999, p. 213). Using this definition, all comments could be considered exemplars, which would mean that no differences would be expected between comment conditions of the same valence. This study also has limitations related to data collection in an online survey setting that may have reduced the likelihood of finding significant effects. First, because of the online setting, participant attention to the screen, and thus

exposure to the experimental stimuli, cannot be guaranteed. Secondly, use of mobile phones may have contributed to low exposure due to the difficulty of reading large amounts of text on a small screen. I estimate that more than 50% of respondents accessed the survey from a mobile device, and using a mobile phone to respond did produce two moderation effects of condition on perceived risk. Researchers should consider these findings when planning research and attempting to balance generalizability of experimental settings and fidelity of experimental treatment. Finally, this study has limitations related to generalizability of measures, stimuli, setting, and population. Results cannot be reliably generalized to other measures of the constructs used in this study, other exemplar stimuli, settings outside the online experimental context, or populations other than women between the ages of 38 and 48 years old.

An additional methodological issue is related to the measurement of perceived risk. The numeric measurement of perceived susceptibility to breast cancer has been shown to be difficult to measure. For example, Schapira, Davids, McAuliffe, and Nattinger (2004) found that accuracy of perceived risk varied based on the timeframe being measured (five-year vs. lifetime) and the measurement format (percentage vs. frequency). In their research, only 31% of scale users used the scales consistently (i.e., provided equivalent estimates on the percentage and frequency scales), and consistency was positively associated with numeracy. The inability of participants to adequately use these scales to express perceived risk may also help explain some of the failed effects, and results may differ when using other measures of perceived risk (e.g., qualitative

measures). Finally, though I did not measure numeracy, future research could examine the possible role of numeracy as a moderator of effects.

Implications

This research has valuable implications related to the effect of comments on risk perceptions. Findings suggest that the topic of comments may shape breast cancer risk perceptions, with mammogram-detected cancer comments heightening perceived risk more than false positive comments and articles presented without comments. Because women already typically overestimate their breast cancer risk (Hoffman et al., 2010), and because risk perceptions may inform screening decisions (Gross, Filardo, Singh, Freedman, & Farrell, 2006), heightening breast cancer risk perceptions may not only needlessly increase breast cancer worry but also push women to make ill-informed screening decisions. Taken together with the findings presented in Chapter 5, this research has implications for those who make decisions about online content related to mammography. It suggests that allowing comments may have harmful effects on readers and that comments may alter the effects of the primary content.

Though proposed mediation pathways were not significant, this study also provides insight into why exemplars did not produce the predicted effects on risk perceptions and provides further understanding of the relationship between affect and perceived risk. Specifically, these findings bolster research showing an association between negative affect and perceived risk of breast cancer (e.g., Dunlop, Wakefield, & Kashima, 2008 and McQueen, Kreuter, Kalesan, & Alcaraz, 2011).

CHAPTER 7

GENERAL DISCUSSION AND CONCLUSION

This dissertation examines the prevalence of exemplars in mammography news articles and user-generated comments, effects of comments on risk perceptions and mammography intentions, and mechanisms through which comments have their effects. This chapter includes a discussion of the main findings of each study, the strengths and limitations of this research, directions for future research, and conclusions that can be drawn from the dissertation as a whole.

Discussion

This dissertation set out to address three primary research objectives related to exemplars in user-generated comments that accompany news articles about mammography:

Objective 1: Describe the prevalence, content, and representativeness of mammography exemplars in comments on online news about mammography.

Objective 2: Test the effects of comments with exemplars on risk perceptions and mammography intentions.

Objective 3: Explore the mechanisms of action underlying effects of exemplar comments on risk perceptions and mammography intentions.

Objectives 1, 2 and 3 are directly addressed by the results presented in Chapters 2, 5, and 6, and the main results from this dissertation can be summarized as follows:

- Study 1 found that approximately one-third of comments on news articles about mammography included a mammography exemplar. Of comments including a mammography exemplar, 41% included a mammogram-detected breast cancer exemplar, 24% included an exemplar in which breast cancer was detected through other means, and 19% included a false-positive mammogram exemplar. Given an average population breast cancer rate of 12.5%, exemplars depicting cancer diagnoses are overrepresented. Exemplar type was also related to comment valence toward mammography; most comments with false-positive exemplars were cautious toward mammography, and most comments with mammogram-detected breast cancer exemplars were enthusiastic toward mammography. Additionally, articles with mammography exemplars were more likely to have comments that also included mammography exemplars.
- In Study 2, when compared to conditions without exemplars, comments with exemplars did not produce effects on mammography intentions or risk perceptions. However, there were differences in mammography intentions and risk perceptions between the two types of exemplar conditions (mammogram-detected breast cancer exemplars vs. false-positive mammogram exemplars) and between comments of different topic and valence (all mammogram-detected breast cancer conditions vs. all false-positive mammogram conditions). Compared to comments about false positives, comments about mammogram-detected breast cancer led to higher intentions to have a mammogram in the next

two years, lower intentions to wait until age 50 to have a mammogram, and higher breast cancer risk perceptions.

- The examination of mechanisms of effects of comments demonstrated that most predicted mediation pathways did not exist. This was mostly due to a failure of exemplar conditions to produce effects on the proposed mediators. Though exemplars often failed to have the predicted effects on proposed mediators, proposed mediators were consistently significantly associated with the outcomes of interest (e.g., narrative transportation, attitudes, perceived norms, and self-efficacy were associated with mammography intentions, and negative affect was related to perceived risk of having breast cancer and perceived risk of having a positive mammogram). Exploratory analyses revealed that attitudes toward waiting until age 50 to have a mammogram mediated some of the effects of comment topic/valence on intentions. Additionally, exploratory analyses found that the predicted effects of exemplars often did emerge for participants high in ability and motivation to read the stimulus materials (i.e., those high in education, with a family history of breast cancer, or with a history of prior mammograms).

The findings in Study 1 regarding the content of comments on news articles about mammography are relatively novel, as the author could find no prior published content analyses of comments appearing with mammography news. There are, however, some similarities to findings from related research. The prevalence of exemplars in comments was similar to the prevalence in analyses of comments on other health issues. For

example, Len-Rios, Bhandari, and Medvedeva (2014) found that 42% of comments on articles about breastfeeding recommendations discussed personal experiences. Similarly, the prevalence of mammography exemplars in comments, in particular, was comparable to the prevalence of mammography exemplars in an analysis of Twitter comments on breast cancer screening (Lyles, López, Pasick, and Sarkar, 2013). However, findings related to the association between exemplars in articles and exemplars in comments are contrary to previous related research. For example, Holton, Lee, and Coleman (2014) found no association between episodic framing of general health articles and episodic framing of comments, nor did Suran, Holton, and Coleman (2014) find an association between an article being about cancer and the frame of the comments (i.e., articles about cancer were not more or less likely to have episodic comments). Overall, Study 1 contributes to a general understanding of the content of user-generated comments that appear with online news articles about mammography by providing further evidence that exemplars appear in online comments, describing the prevalence of various types of exemplars in these comments, and providing evidence of a correspondence between exemplars in articles and exemplars in comments. Understanding the prevalence, type, and lack of representativeness of mammography exemplars present in comments is necessary for researchers interested in investigating the effects of these comments on readers.

Study 2 found that the topic of comments—but not the presence of exemplars—had an effect on intentions and risk perception. The lack of effects of exemplars on mammography intentions and risk perceptions was unexpected. Alternate explanations

for the lack of effects observed in the immediate post-test include lack of participant attention to the stimuli, inadequate contrast between exemplar and nonexemplar conditions (i.e., a weak manipulation), and the possibility that effects are not immediate but will emerge over time (i.e., a “sleeper effect”). Differences in intention between comments about mammogram-detected breast cancer and comments about false positives may be due to the different valence of these comments. This effect is supported by prior literature, which has found effects of comment valence on various outcomes, including perceived effectiveness of the message accompanied by the comments (Walther, DeAndrea, Kim, & Anthony, 2010), opinions (Lee & Jang, 2010; Witteman, Fagerlin, Exe, & Zikmund-Fisher, 2013) and behavioral intentions (Witteman, Fagerlin, Exe, & Zikmund-Fisher, 2013). The increase in breast cancer risk perceptions seen in participants who read about mammogram-detected breast cancer may be due to the availability heuristic (Tversky & Kahneman, 1982). Overall, the effects of comments may have been harmful to participants by heightening risk perceptions in women who already tend to overestimate breast cancer risk (Hoffman et al., 2010).

Results from Study 2 also showed that very few of the hypothesized mediation pathways were supported by the data. Many of these paths were not significant because exemplar conditions (when compared to nonexemplar conditions) failed to have an effect on the predicted mediator. This may have been due to low exposure to the intervention, a weak manipulation, a lack of power to detect very small effects, or the short length of exemplars used (which may have been too brief to allow for narrative transportation). Though the hypothesized mediation pathways were not significant, this study provides

further understanding of perceived risk and theories of behavioral prediction in the mammography context. That is, because attitudes, norms, and self-efficacy reliably predicted behavioral intentions, this research offers additional support for the validity of applying the Integrative Model (Fishbein, 2000) and Reasoned Action Model (Fishbein & Ajzen, 2010) to mammography behavior. These findings also bolster research showing an association between negative affect and perceived risk of breast cancer (see, for example, Dunlop, Wakefield, & Kashima, 2008 and McQueen, Kreuter, Kalesan, & Alcaraz, 2011). Additionally, findings from moderation analyses are consistent with the Elaboration Likelihood Model (Petty & Cacioppo, 1981, 1986a, 1986b) and suggest that the proposed effects of exemplars may only exist for those who are motivated and able to process them.

Strengths and Limitations

Though these studies have both strengths and limitations, they offer unique contributions to the understanding of user-generated comments that appear with online news articles about mammography. One of the strengths of the content analysis presented in Study 1 is that it addresses an under-researched area—little was previously known about the content of these comments. It is even more unique in its attempts to quantify the presence of exemplars in these comments. Additionally, it contributes to knowledge on the relationship between article features and comment features and generates a set of data that can be used to further explore this area. Finally, this design is strengthened by capturing all articles about mammography published in a single source over a five-year period (as opposed to a sample of articles published during this time

period or all articles appearing around a particular event over a short timespan) and taking a stratified sample of comments that allows each article to be represented in the data. This increases confidence that findings will generalize to future media coverage of mammography.

The experimental design offers a number of strengths that enhance the value of this research. First, the use of an experimental design, rather than an observational design, helps to establish causal order in the study of effects of comments on outcome variables. Additionally, because participants were randomly assigned to condition, the risk of confounding variables is mitigated. Further, a between-subjects experimental design minimizes fatigue and eliminates cross-over effects associated with within-subjects designs. An additional strength of this research is that the stimuli consisted of real comments from readers of *The New York Times*. Even in the conditions that used comments in which exemplars were removed, the majority of the content was user-generated. This not only creates a feeling of authenticity for the participant and bolsters the credibility of the cover story, but it also increases the external generalizability of the findings. The online experimental context further increases generalizability by testing effects in an online environment similar to the one in which readers of online news are typically exposed to content. Finally, the use of multiple sets of comments that were randomly selected from large pools of comments and randomly ordered reduces order effects and the risk of a case-category confound. This design also functions as a way to build in experimental replication (O’Keefe, 2015), an additional strength.

While many of the strengths of Study 2 stem from the experimental design described above, there are additional benefits of the analytical methods used. Traditional mediation analysis approaches suggest that one should not pursue mediation analysis in the absence of a direct effect of the independent variable on the dependent variable (in this case, if the condition failed to have an effect on intentions or risk perceptions). However, Hayes (2009) explains that this approach would fail to detect some intervening effects, thus a direct effect of the independent variable on the dependent variable should not be a prerequisite for testing for indirect effects. Hayes (2009, 2013) further argues that the Baron and Kenny (1986) method for testing mediation is low in power and that the Sobel (1982, 1986) test, another popular method for testing the significance of an indirect effect, is flawed in its reliance on the assumption that the sampling distribution of the indirect effect is normal. In lieu of using these methods, Hayes (2009, 2013) recommends the use of bootstrapping to construct a confidence interval for the indirect effect as a means of testing that it is significantly different from zero. By using Hayes' approach of creating 10,000 bootstrapped samples and bias-corrected confidence intervals for each indirect effect tested, this research avoids the issues with mediation testing identified by Hayes.

Despite the general strengths of the methodological approach of these studies, this research has limitations related to generalizability, experimental design, and data collection. First, the findings of Study 1 are limited in their generalizability. Despite the wide readership of *The New York Times*, the *Times* is not a national newspaper and may not be representative of other media outlets. Additionally, readers of the *Times* are more

educated and more liberal than consumers of other news sources such as *USA Today*, local daily newspapers, or television news (The Pew Research Center for the People & the Press, 2012). Thus, articles published in *The New York Times* may not be representative of articles on mammography found in other media during the time period covered by the content analysis, and comments on these articles may differ from comments that would be produced by readers of other online news sources. Finally, because the content analysis was limited to newspaper coverage of mammography, the results cannot be reliably generalized to other types of media or other health topics.

Study 2 also has limitations related to generalizability of results. Experimental findings are primarily limited because of the experimental stimuli used. I only used one article, so the effect of comments used with this particular article may differ from effects of comments with other articles. Additionally, though one of the strengths of the study is that the stimulus comments were real comments (or edited versions of real comments) found on mammography articles from *The New York Times*, I could not use all of the coded comments because some would not make sense with the article. This may limit generalizability to other types of comments that were not used or to comments and articles found in other media outlets. Additionally, this experiment included only false-positive comments that were cautious toward mammography and mammogram-detected breast cancer comments that were pro-mammography for experimental simplicity. This means findings can be generalized to most but not all false positive comments and mammogram-detected breast cancer comments. Finally, this study has limitations related to generalizability of measures, setting, and population. Results cannot be reliably

generalized to other measures of the constructs used in this study, settings outside the online experimental context, or populations other than women between the ages of 38 and 48 years old.

Study 2 is further limited by elements of the experimental design. First, the decision to use comments in the mammogram-detected breast cancer conditions that were all pro-mammogram and comments in the false-positive mammogram conditions that were cautious toward mammography means that valence and content are conflated and their effects cannot be disentangled in this experiment. This limitation could be addressed in future research that adds a valence factor to the experimental design. The operationalization of an exemplar and selection of the comparison conditions are also limitations of this design and may have contributed to a lack of effects. Because exemplars were operationalized as a mention of an individual in a comment, exemplar comments and nonexemplar comments may have been too similar, resulting in a weak manipulation. Additionally, because much of Zillmann's work on exemplars compares exemplar conditions to conditions with numeric base-rates (e.g., Zillmann, 2006), the choice to use nonexemplar comparison conditions that lacked exemplars but did not include base-rates may have contributed to the lack of expected effects. A further limitation of the experimental design is that it does not allow this research to address whether comments matter due to their form or because of the content they add to the article. Future research should investigate whether the form of comments allows them to have effects over and above the effects of the content they contain. For example, one could compare a condition in which participants read an article followed by comments to

one in which participants read an article with these same comments embedded in the article text. A difference between these conditions would suggest that the effect of comments is not due solely to the content comments provide but to some other feature.

Finally, Study 2 has limitations related to data collection. Though allowing participants to participate in the experiment via mobile device may have increased external validity by simulating real conditions in which people are exposed to media content and user-generated comments, it raises concerns about participants' exposure to the manipulation and may have reduced effects. However, most moderation analyses that included use of a mobile phone as a moderator were not significant. Related to this issue is the finding that many participants spent only a short amount of time on the comment page, which was the primary experimental manipulation. Though some effects of comments were observed (e.g., effects of topic on intention and risk perceptions) and most moderation analyses using response time were not significant, the brevity of exposure may have contributed to a lack of effects of exemplars. Many of these limitations can be addressed in future research.

Directions for Future Research

This research provided insight into the content of reader comments on online mammography news articles and the effects these comments may have on readers. While the content analysis and experiment answered key research questions, they also raised additional questions for future research.

Compared to the study of media content produced by news organizations, the study of comments appearing with these news articles is a relatively new area and replete

with possibilities for additional research. One potential line of research involves developing further understanding of the characteristics of people who write comments on news articles and those who read these comments. Though there is a small amount of population-level data that estimates the number of people who have read user-generated comments, little is known about the characteristics that separate readers from non-readers. Possible differences include differences in need for information, need for cognition, desire to connect with others, or other individual characteristics. Even less is known about the motivations behind posting comments and characteristics that may be associated with this behavior. Within the study of why people post comments on news stories, there also exists a more specific need to understand what makes individuals more likely to include exemplars in their comments.

An additional potential line of research that emerged from Study 1 involves understanding how article characteristics influence comment characteristics. Particularly, future research should examine possible explanations for the association between mammography exemplars in articles and mammography exemplars in comments (and the absence of this association for breast cancer exemplars). Additionally, one could use automated linguistic analysis to examine how other characteristics of the article, such as the use of first-person pronouns or emotion words, affect comment characteristics.

Study 2 also raised additional questions for future research. Most importantly, future work is needed to separate the effects of comment topic and comment valence toward mammography. This could be done using a 2 (valence toward mammography: pro vs. con) by 2 (exemplar: present vs. absent) design with or without a no comment

control condition. This line of research could also be furthered by replicating the experiment using different types of nonexemplar conditions as comparison conditions (e.g., conditions that use statements with numeric base-rates or conditions in which comparable information is presented but not in a comment form or attributed to another reader). Finally, future research should expand efforts to understand mechanisms of effect by searching for additional mediators of the effects of comment topic on risk perceptions and mammography intentions, such as cognitive availability of breast cancer cases. Additional research should also examine additional potential moderators of effects of comments, including need for cognition, health literacy, and numeracy.

Conclusion

User-generated comments on online news articles about mammography often include mentions of individuals' experiences with mammography and breast cancer. These comments can have an impact on comment readers' breast cancer risk perceptions and intentions to have or delay a mammogram. In particular, exposure to user-generated comments that are favorable toward mammography and about the topic of mammogram-detected breast cancer can lead to higher risk perceptions and higher intentions to screen than exposure to 1) comments that are cautious toward mammography and about the topic of false-positive mammograms and 2) articles presented without comments. This study adds to the body of evidence that suggests that comments appearing with news articles have effects on readers. It suggests that news organizations, health organizations, and others who share content online and allow user-generated comments should consider the impact of these effects before allowing comments to be posted. Further research is

needed to fully understand the role that the presence of mammography exemplars in comments may play in these effects.

APPENDIX A

CONTENT ANALYSIS CODEBOOK

ARTICLES

Basic Information and Inclusion Criteria

[articleID] Article ID number

[title] Article title, as appearing in search

[altitle] Alternate title, if applicable (sometimes web and print versions have different titles)

[date] Article date in MM/DD/YYYY format

[lexisnexis] Found in LexisNexis search

0. No

1. Yes

[nytimescom] Found in NYTimes.com search

0. No

1. Yes

[type] Article type:

1. Newspaper article

2. Blog post

3. Opinion/Editorial

4. Magazine

5. Letter/reader reaction

6. Other: death notice, engagement announcement, wedding announcement, correction, book review, or other

[duplicate] Is article a duplicate of an article already coded?

0. No
1. Yes

If **0** (no), continue. If **1** (yes), coding is complete.

*Note: If duplicate, and one is print and one is web/blog, code the web/blog version.

[include] Should article be included in database of articles about mammography? First,

exclude if article **type** is coded as **5** or **6**. **Include** if

mammogram/mammography/breast cancer screening/breast screening is in the title of the article OR at least 50% of paragraphs mention breast cancer screening/mammography or are generally about breast cancer screening/mammography. Otherwise, **exclude**.

Include article in database?

0. No
1. Yes

If **1** (yes), continue to next item. If **0** (no), coding is complete.

[url] Article URL

[comments] Does online version of article have comments?

0. No
1. Yes

Article contents

[guidelines] Does the article mention guidelines for when women should be screened for breast cancer? This includes even very general mentions of when to begin screening.

0. No

1. Yes

[2009guidelines] Does the article specifically mention the 2009 guidelines issued by the U.S. Preventive Services Task Force?

0. No

1. Yes

[komen] Does the article mention Susan G. Komen for the Cure?

0. No

1. Yes

[nci] Does the article mention the American Cancer Society?

0. No

1. Yes

[nci] Does the article mention the National Cancer Institute?

0. No

1. Yes

[uspstf] Does the article mention the U.S. Preventive Services Task Force?

0. No

1. Yes

[acr] Does the article mention the American College of Radiology?

0. No

1. Yes

[articlevalence] Would you consider the overall tone of the article to be...

1. More enthusiastic toward mammography than cautious
2. More cautious toward mammography than enthusiastic
3. Balanced/neutral—neither more enthusiastic nor more cautious

[artbcexemplars] Does the article mention an individual's experience with breast cancer (a breast cancer exemplar)? Note: This should be a specific person, not a reference to women or a woman in general.

0. No, or unclear
1. Yes

If **0** (no), skip to **artnomammogram**. If **1** (yes), continue.

[artbcexemplarsnum] How many breast cancer exemplars are mentioned in the article?

1. 1
2. 2
3. 3 or more

[artnomammogram] Does the comment include someone who makes a decision to not have a mammogram/mammograms (or to delay one)? This includes those who have had a mammogram in the past and but have made a decision to not have another one (or delay having another one). Note: This should be a specific person, not a reference to women or a woman in general.

0. No, or unclear
1. Yes

If **0** (no), skip to **artmammexemplars**. If **1** (yes), continue.

[artnomammogramnum] How many individuals who made a decision to not have a mammogram/mammograms are included in the article?

1. 1
2. 2
3. 3 or more

[artmammexemplars] Does the article mention at least one individual's experience with mammography (a mammography exemplar)? (Note: These may be overlap with breast cancer exemplars. For example, an individual in the comment may refer to having had a mammogram and having had breast cancer; in that case, both **artbcexemplars** and **artmammexemplars** would be coded **1**.) Note: This should be a specific person, not a reference to women or a woman in general.

0. No, or unclear
1. Yes

If **0** (no), skip to the **end** and coding is complete. If **1** (yes), continue.

[artmammexemplarsnum] How many mammography exemplars/individuals are mentioned in the article?

1. 1
2. 2
3. 3 or more

[artfalsepositive] Does it include an exemplar with a false-positive mammography outcome (includes call-backs for additional screening, referral for further testing, biopsy)?

0. No
1. Yes

If **0** (no), skip to **artcanceroutcome**. If **1** (yes), continue.

[artfalsepositivenum] How many exemplars with a false-positive mammography outcome are included?

1. 1
2. 2
3. 3 or more

[artcanceroutcome] Does it include an exemplar with a screening mammogram-detected cancer outcome (Note: This should be a screening mammogram, not a diagnostic mammogram following development of symptoms or discovery of a lump through other means)?

0. No
1. Yes

If **0** (no), skip to **artnofalsepositive**. If **1** (yes), continue.

[artcanceroutcomenum] How many exemplars with a mammogram-detected cancer outcome are included?

1. 1
2. 2

3. 3 or more

[artnofalsepositive] Does it include an exemplar who had a mammogram and no false positive results from the mammogram or cancer?

0. No
1. Yes

If **0** (no), skip to **artlumporbc**. If **1** (yes), continue.

[artnofalsepositivenum] How many exemplars with mammograms and no false positives or cancer are included?

1. 1
2. 2
3. 3 or more

[artlumporbc] Does it include an exemplar who had a lump or breast cancer detected by a means other than mammogram (Note: This includes people who discovered a lump and went on to have a diagnostic mammogram)?

0. No
1. Yes

If **0** (no), skip to **artfalsenegative**. If **1** (yes), continue.

[artlumporbcnum] How many exemplars with lump or breast cancer detected without a mammogram are included?

1. 1
2. 2
3. 3 or more

[artfalsenegative] Does it include an exemplar who had a false negative (i.e., breast cancer that was missed by a mammogram)? (Note: All false negatives should also be coded as **artlumporbc**, but the reverse is not necessarily true.)

0. No
1. Yes

If **0** (no), skip to the **end** and coding is complete. If **1** (yes), continue.

[artfalsenegnum] How many false negative exemplars are included?

1. 1
2. 2
3. 3 or more

End

COMMENTS

Basic Information

[maincommentID] Overall comment ID number, each comment in the database receives unique number

[commentarticleID] ArticleID to which comment corresponds

[commentID] comment ID, comment number within article

[authorname] Name of author

[commentdate] Date of comment in MM/DD/YYYY HH:MM format

[location] Location, if given (not available for all comments)

[nytoppick] Marked as an NYT “pick” (not available for all comments)

0. No

1. Yes

[recommends] number of times comment was “recommended” (not available for all comments)

[commenttext] Text of comment

[commentlength] Number of words in comment (automatically calculated in Excel)

Comment Contents

[includecomment] Is the comment related to mammography/mammograms?

[Notes to coders:

- If it mentions mammography or breast cancer screening, it should definitely be included. It does not, however, have to use the word “mammogram”/”mammography.” For example, those that refer to the change in mammography recommendations should be included (including references to recommendations, guidelines, and the USPSTF), even if they don’t use the word “mammograms.”
- Alternate terms: Sometimes, a comment will use the word “screening” and it can be inferred that they are talking about breast cancer screening. These should be included. Others use the word “testing” or “exam” when referring to mammography, and these should be included as well (but be careful to not include those that only discuss breast self-exams, MRI, or ultrasounds).
- Do not include those that only talk about breast cancer without referring to mammography.]

0. No
1. Yes

If **0** (no), skip to the end and coding is complete. If **1** (yes), continue.

[commentvalence] Would you consider the overall tone of the comment to be...

1. More enthusiastic toward mammography than cautious
2. More cautious toward mammography than enthusiastic
3. Balanced/neutral—neither more enthusiastic nor more cautious

[explicitrec] Does the comment make an explicit recommendation regarding mammography (e.g., “get a mammogram,” “every woman should get a mammogram,” “I advise against routine mammograms,” etc.)?

0. No, or unclear
1. Yes, explicit recommendation for mammography
2. Yes, explicit recommendation against mammography

[implicitrec] Does the comment make an implicit recommendation regarding mammography (e.g., “I am going to get a mammogram,” [implicit for] “I am going to stop getting mammograms,” [implicit against] “mammograms save lives,” [implicit for] “mammograms cause harm,” [implicit against] referring to mammograms as important [implicit for], unnecessary [implicit against], or dangerous [implicit against], etc.)?

0. No, or unclear
1. Yes, implicit recommendation for mammography
2. Yes, implicit recommendation against mammography

[exemplar] Does the comment have any exemplars (an example case)?

- 0. No
- 1. Yes

If **0** (no), skip to **fpnoexemplar**. If **1** (yes), continue.

[bcexemplars] Does the comment mention an individual's experience with breast cancer (a breast cancer exemplar)? Note: This should be a specific woman, not a reference to women or a woman in general.

- 0. No, or unclear
- 1. Yes

If **0** (no), skip to **nomammogram**. If **1** (yes), continue.

[numberbcexemplars] How many breast cancer exemplars/individuals are mentioned in the comment?

- 1. 1
- 2. 2
- 3. 3 or more

[nomammogram] Does the comment include someone who makes a decision to not have a mammogram/mammograms (or to delay one)? This includes those who have had a mammogram in the past and but have made a decision to not have another one (or delay having another one). Note: This should be a specific woman, not a reference to women or a woman in general.

- 0. No, or unclear
- 1. Yes

If **0** (no), skip to **mammexemplars**. If **1** (yes), continue.

[nomammogrampov] What is the point of view of the person who makes a decision to not have a mammogram/mammograms (i.e., if the comment author decides to not have a mammogram, code as first-person; if the comment author describes someone else who decides not to have a mammogram, code as third-person)?

1. First-person
2. Third-person

[mammexemplars] Does the comment mention at least one individual's experience with mammography (a mammography exemplar)? (Note: These may be overlap with breast cancer exemplars. For example, an individual in the comment may refer to having had a mammogram and having had breast cancer; in that case, both **bcexemplars** and **mammexemplars** would be coded **1**.) Note: This should be a specific woman, not a reference to women or a woman in general.

0. No
1. Yes

If **0** (no), skip to the end and coding is complete. If **1** (yes), continue.

[numbermammexemplars] How many mammography exemplars/individuals are mentioned in the comment?

1. 1
2. 2
3. 3 or more

[Note: In the rare case that any of there are multiple narratives of any of the following types and they are from different points-of-view, code only the first one mentioned.]

[falsepositive]

Does it include an exemplar with a false-positive mammography outcome (includes call-backs for additional screening, referral for further testing, biopsy)?

0. No
1. Yes

If **0** (no), skip to **canceroutcome**. If **1** (yes), continue.

[falsepositivepov] What is the point of view of the exemplar with a false-positive mammography outcome?

1. First-person
2. Third-person

[canceroutcome] Does it include an exemplar with a screening mammogram-detected cancer outcome (Note: This should be a screening mammogram, not a diagnostic mammogram following development of symptoms or discovery of a lump through other means)?

0. No
1. Yes

If **0** (no), skip to **nofalsepositive**. If **1** (yes), continue.

[canceroutcomepov] What is the point of view of the exemplar with a mammogram-detected cancer outcome?

1. First-person
2. Third-person

[nofalsepositive] Does it include an exemplar who had a mammogram and no false positive results from the mammogram or cancer?

0. No
1. Yes

If **0** (no), skip to **lumporbc**. If **1** (yes), continue.

[nofalsepositivepov] What is the point of view of the exemplar who had a mammogram and no false positives or cancer?

1. First-person
2. Third-person

[lumporbc] Does it include an exemplar who had a lump or breast cancer detected by a means other than mammogram (Note: This includes people who discovered a lump and went on to have a diagnostic mammogram)?

0. No
1. Yes

If **0** (no), skip to **falsenegative**. If **1** (yes), continue.

[lumporbcpov] What is the point of view of the exemplar who had a lump or breast cancer detected by a means other than mammogram?

1. First-person
2. Third-person

[falsenegative] Does it include an exemplar who had a false negative (i.e., breast cancer that was missed by a mammogram)? (Note: All false negatives should also be coded as **lumporbc**, but the reverse is not necessarily true.)

- 0. No
- 1. Yes

If **0** (no), skip to the end, and coding is complete. If **1** (yes), continue.

[falsenegativepov] What is the point of view of the exemplar who had a false negative?

- 1. First-person
- 2. Third-person

Skip to the end, and coding is complete.

[fpnonexemplar] Does this comment (without exemplars) mention or allude to the concept of false positive mammography results?

- 0. No, or unclear
- 1. Yes

[mdbcnonexemplar] Does this comment (without exemplars) mention or allude to the concept of mammogram-detected breast cancer?

- 0. No, or unclear
- 1. Yes

[fpnonexemplar] Does this comment (without exemplars) mention or allude to the concept of false positive mammography results?

- 0. No, or unclear
- 1. Yes

[mdbcnonexemplar] Does this comment (without exemplars) mention or allude to the concept of mammogram-detected breast cancer?

- 0. No, or unclear

1. Yes

END

APPENDIX B

ARTICLES INCLUDED IN ANALYSIS

The full list of articles included in the content analysis is included below. The LexisNexis and *New York Times* website columns indicate whether an article was retrieved in the search using that particular method. An “N/A” in the “number of comments” column indicates that comments were not allowed on that article.

Table B1

Article title	Publication date	LexisNexis	<i>New York Times</i> website	Article type	Number of comments
Breast Cancer: Who Should Be Screened?	11/3/2009	No	Yes	blog post	139
Quandary With Mammograms: Get a Screening, or Just Skip It?	11/3/2009	Yes	Yes	news article	N/A
Getting Screened for Breast Cancer	11/16/2009	No	Yes	blog post	147
New Guidelines Suggest Cutback In Mammograms	11/17/2009	Yes	Yes	news article	631
BlogTalk: Breast Cancer Screening, Magazine Covers	11/17/2009	No	Yes	blog post	16
Republicans Say Cancer Screening Guidelines Portend Medical Rationing	11/17/2009	No	Yes	blog post	54

New Guidelines on Breast Cancer Draw Opposition	11/17/2009	Yes	Yes	news article	N/A
Many Doctors to Stay the Course on Breast Exams for Now	11/18/2009	Yes	Yes	news article	318
New Mammogram Advice Finds a Skeptical Audience	11/18/2009	Yes	Yes	news article	N/A
G. O. P. Women Attack Mammogram Guidelines	11/18/2009	No	Yes	blog post	N/A
Republican Lawmakers Criticize New Cancer Guidelines	11/18/2009	No	Yes	blog post	N/A
Breast Cancer Screening Policy Won't Change, U.S. Officials Say	11/19/2009	Yes	Yes	news article	96
Among Clinics, the Mammogram Is Slipping as a Popular Offering	11/19/2009	Yes	Yes	news article	N/A
Sebelius on Mammograms: Don't Change What You're Doing	11/19/2009	No	Yes	blog post	N/A
The Controversy Over Mammograms	11/20/2009	Yes	Yes	opinion/editorial	152
The Uproar Over Mammography	11/20/2009	No	Yes	blog post	19
Addicted to Mammograms	11/20/2009	Yes	Yes	opinion/editorial	N/A
Mammogram Debate Took Group by Surprise	11/20/2009	Yes	Yes	news article	N/A
Get a Test. No Don't. Repeat	11/22/2009	Yes	Yes	news article	N/A
Confused? Get the Mammogram	11/23/2009	No	Yes	blog post	2
Behind Cancer Guidelines, Quest for Data	11/23/2009	Yes	Yes	news article	N/A
Study Questions Safety of Mammograms for Young Women at High Risk of Cancer	12/1/2009	Yes	Yes	news article	N/A
Senate Blocks Use of New Mammogram Guidelines	12/3/2009	No	Yes	blog post	N/A
Mammogram Math	12/13/2009	Yes	Yes	magazine article	N/A

Gauging the Odds (And the Costs) In Health Screening	12/20/2009	Yes	Yes	news article	N/A
Mammograms and Severe Dementia	2/15/2010	No	Yes	blog post	83
Women Resolve to Keep Getting Mammograms	2/15/2010	No	Yes	blog post	80
Doctor-Patient Divide On Mammograms	2/16/2010	Yes	Yes	news article	N/A
SCREENING: Gaps Found in Breast Cancer Testing	7/20/2010	Yes	Yes	news article	N/A
Radiation And Risks Are Focus Of Studies	8/24/2010	Yes	Yes	news article	N/A
New Treatments Are Challenging Mammogram's Need, Study Says	9/23/2010	Yes	Yes	news article	75
Mammogram Benefit Seen For Women in Their 40s	9/30/2010	Yes	Yes	news article	N/A
Adding MRIs to Mammograms for High-Risk Women	11/15/2010	No	Yes	blog post	46
A Doctor's Mammogram Mission Turns Personal	12/21/2010	Yes	Yes	news article	N/A
Audit Finds Long Waits For Mammograms in City	5/5/2011	Yes	Yes	news article	N/A
SCREENING: New Threat Rises Between Mammograms	5/10/2011	Yes	Yes	news article	N/A
Screening: Mammograms Seen Ineffective in Europe	8/2/2011	Yes	Yes	news article	N/A
You Have to Gamble on Your Health	10/11/2011	Yes	Yes	opinion/editorial	N/A
Mammogram's Role as Savior Is Tested	10/24/2011	Yes	Yes	blog post	344
More Questions About Mammograms	10/27/2011	Yes	Yes	opinion/editorial	N/A
Mayor to Give \$250,000 to Planned Parenthood	2/2/2012	Yes	Yes	blog post	702
A Better Way to Spend Breast Cancer Funds?	2/7/2012	Yes	No	blog post	59
Real Race In Cancer Is Finding Its Cause	2/7/2012	Yes	Yes	news article	N/A
Fewer Younger Women Are Getting Mammograms	7/2/2012	Yes	Yes	blog post	42
POSTINGS RECENT ENTRIES FROM OUR BLOGS	7/3/2012	Yes	Yes	news article	N/A

Laws Add Dimension, and Questions, to Breast Cancer Screening	10/25/2012	Yes	Yes	news article	142
Cancer Survivor or Victim of Overdiagnosis?	11/22/2012	Yes	Yes	opinion/editorial	N/A
Ignoring the Science on Mammograms	11/28/2012	Yes	Yes	blog post	430
Stress of Cancer Scare May Last Years	3/22/2013	Yes	Yes	blog post	25
The Problem With Pink	4/28/2013	Yes	Yes	magazine article	629
Behind the Cover Story: Peggy Orenstein on Rethinking Her Stance on Mammograms	4/29/2013	Yes	Yes	blog post	21
Komen Chooses New Leader	6/19/2013	Yes	No	news article	N/A
ABC Anchor's On-Air Test Found Breast Cancer	11/12/2013	Yes	Yes	news article	N/A
Breast Cancer Screenings: What We Still Don't Know	12/30/2013	Yes	Yes	opinion/editorial	107
Vast Study Casts Doubts on Value of Mammograms	2/12/2014	Yes	Yes	news article	645
The Problem With Mammograms	2/12/2014	Yes	Yes	blog post	7
For Women, a More Complicated Choice	2/12/2014	Yes	Yes	news article	N/A
Why I Never Got Screened	2/15/2014	Yes	Yes	opinion/editorial	275
Flips and Spins in Sochi and on Mammograms	2/16/2014	Yes	Yes	news article	N/A
Mammography's Limits, Seldom Understood	3/14/2014	Yes	Yes	blog post	71
Look for Cancer, and Find It	4/7/2014	Yes	Yes	blog post	131
Ex-Radiology Tech Filed False Mammogram Results	4/15/2014	No	Yes	news article	N/A
Former Ga. Technician Falsified Mammogram Reports	4/27/2014	No	Yes	news article	N/A
Universal Mammograms Show We Don't Understand Risk	5/7/2014	No	Yes	news article	161
Dense Breasts May Obscure Mammogram Results	6/16/2014	Yes	Yes	blog post	134

Mammograms May Cut Breast Cancer Deaths by 28%	6/17/2014	No	Yes	news article	N/A
3-D Mammogram Scans May Find More Breast Cancer	6/24/2014	No	Yes	news article	N/A
Study Finds 3-D Mammogram Can Improve Cancer Detection	6/25/2014	Yes	Yes	news article	N/A
Former Adobe Exec's Start-Up Seeks to Improve the Mammogram Experience	11/3/2014	No	Yes	news article	N/A
Retesting Breast Cancer Axioms	11/10/2014	Yes	Yes	blog post	84
Next Steps Uncertain for Women With Dense Breasts	12/8/2014	No	Yes	news article	N/A

APPENDIX C

EXPERIMENT QUESTIONNAIRE AND PROGRAMMING INSTRUCTIONS

[Note: Text appearing in brackets will not be visible to participants.]

[CONSENT]

Consent Form

The University of Pennsylvania is conducting an online research study on women's ideas about mammograms. A mammogram is an x-ray of the breast used to screen for breast cancer.

The survey will take approximately 15 minutes to complete and you will be compensated according to your panel's normal compensation options.

Your participation in this study is completely voluntary and you may withdraw at any time. There are no known risks but if any of the questions make you feel uncomfortable, you may skip that question or leave the survey. The information you give will be kept confidential and will not be linked to your name.

The researcher, a doctoral student at the Annenberg School for Communication, will have access to the anonymous data. This research is funded by a fellowship from The Wharton School at the University of Pennsylvania. All data will be stored securely at the Annenberg School for Communication at the University of Pennsylvania.

As a reminder, this study is meant to be taken on a computer or iPad. Please do not try to participate in this study from a smart phone.

If you have any questions about the study, you may contact the researcher, Holli Seitz (hseitz@asc.upenn.edu). This study has been approved by the Institutional Review Board (IRB) at the University of Pennsylvania. You may contact the IRB at the University of Pennsylvania if you have any questions or concerns about your rights as a research participant (215-898-2614).

If you would like to participate in this short survey, please proceed to the next page. We ask that you please complete the survey in one sitting.

If you would not like to participate, please close the browser now.

[SCREENING QUESTIONS]

[Sex]

[sex] What is your sex? [force answer]

1. Male
2. Female

[page break]

[Age]

[age] What is your age? [drop-down menu, under 18, ages 18-75 listed individually, over 75; force answer]

[If participant is male and/or not between the ages of 38 and 48 (inclusive), exclude and send to exclusion text; otherwise, continue to pre-test]

[High risk of breast cancer]

[bchistory] Have you ever had or do you currently have breast cancer (including ductal carcinoma in situ (DCIS) and lobular carcinoma in situ (LCIS))?

1. No
2. Yes

[brca] Have you ever tested positive for a breast cancer genetic mutation (BRCA1 or BRCA2)?

1. No
2. Yes
3. Don't know

[If participant answers yes to either of these questions, send to exclusion text.]

[page break]

[Exclusion text]

Thank you for your willingness to participate. Unfortunately, you are not eligible for this survey. For more information about breast cancer prevention, screening, and treatment, please visit <http://www.cancer.gov/cancertopics/types/breast>.

[All participants: PRE-TEST]

[Breast cancer and mammography history]

[familyhistory] Have any of your first-degree relatives (mother, sister, or daughter) had breast cancer?

1. No
2. Yes, one first-degree relative has had breast cancer
3. Yes, more than one first-degree relative has had breast cancer
4. Don't know

[mammohistory] A mammogram is an x-ray of each breast to look for breast cancer.

Have you ever had a mammogram?

1. No
2. Yes

[page break]

[If receiving intervention (all conditions except NoInfo): insert instructions for article]

[All participants: POST-TEST]

[Mammography intentions]

Please rate your level of agreement with the following statements:

[mammint] I intend to have a mammogram in the next two years.

1. strongly disagree
2. disagree
3. somewhat disagree
4. neither agree nor disagree
5. somewhat agree
6. agree

7. strongly agree

[waitint] I intend to wait until age 50 to have a mammogram.

1. strongly disagree

2. disagree

3. somewhat disagree

4. neither agree nor disagree

5. somewhat agree

6. agree

7. strongly agree

[Perceived breast cancer risk; adapted from Schapira, Davids, McAuliffe, & Nattinger, 2004]

[5yearfreq] Picture yourself in a room with 99 other women exactly like you. How many of you will get breast cancer in the next five years?

Please pick any number between 0 and 100. [slider scale from 0-100]

[lifefreq] Picture yourself in a room with 99 other women exactly like you. How many of you will get breast cancer in your lifetime?

Please pick any number between 0 and 100. [slider scale from 0-100]

[page break]

[5yearpercent] What do you think your personal risk or chance is of getting breast cancer in the next five years?

Please answer on a scale of 0% to 100%. For example, 0% means “no risk or chance of getting breast cancer” and 100% means “completely certain to get breast cancer.” You can pick any number between 0% and 100%. [slider scale from 0% -100%]

[lifepercent] What do you think your personal risk or chance is of getting breast cancer in your lifetime?

Please answer on a scale of 0% to 100%. For example, 0% means “no risk or chance of getting breast cancer” and 100% means “completely certain to get breast cancer.” You can pick any number between 0% and 100%. [slider scale from 0% -100%]

[Perceived risk of a false-positive mammogram]

A “false positive” happens when a woman has a mammogram that leads to more screening, tests, or biopsies, but then finds out she does not have breast cancer.

[falseposfreq] Picture yourself in a room with 99 other women exactly like you. If all of you have a mammogram in the next two years, how many of you will have a false positive (the need for extra testing that later shows you don't have cancer)?

Please pick any number between 0 and 100. [slider scale from 0-100]

[falsepospercent] If you have a mammogram in the next two years, what do you think your personal risk or chance is of having a false positive (the need for extra testing that later shows you don't have cancer)?

Please answer on a scale of 0% to 100%. For example, 0% means “no risk or chance of having a false positive” and 100% means “completely certain to have a false positive.”

You can pick any number between 0% and 100%. [drop-down list from 0% -100%]

[page break]

[Perceived risk of a positive mammogram]

[posmamfreq] Picture yourself in a room with 99 other women exactly like you. If you all had a mammogram today, how many of you would have a mammogram that finds cancer?

Please pick any number between 0 and 100. [slider scale from 0-100]

[posmampercent] If you had a mammogram today, what do you think your personal risk or chance is of having a mammogram that finds cancer?

Please answer on a scale of 0% to 100%. For example, 0% means “no risk or chance of having a mammogram that finds cancer” and 100% means “completely certain to have a mammogram that finds cancer.” You can pick any number between 0% and 100%.

[slider scale from 0% -100%]

[Transportation; Subset adapted from Green & Brock, 2000; similar subsets used by Kim, Bigman, Leader, Lerman, & Cappella, 2012 and by Appel, Gnambs, Richter, & Green, 2015]

[Only asked of conditions receiving comments]

When answering the following questions, think about the comments you read that were left by other readers. How much do you agree with the following statements?

[trans1] I was mentally involved in the comments while reading them.

Not at	1	2	3	4	5	6	7	Very
all								much

[trans2] The comments affected me emotionally.

Not at 1 2 3 4 5 6 7 Very
all much

[trans3] The comments are relevant to my everyday life.

Not at 1 2 3 4 5 6 7 Very
all much

[trans4] After finishing the comments, I found it hard to put them out of my mind.

Not at 1 2 3 4 5 6 7 Very
all much

[page break]

[Affect; PANAS (Watson, Clark, & Tellegen, 1988), select additional items used from the PANAS-X (Watson & Clark, 1994), adapted to use the “*moment instructions*”]

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now (that is, at the present moment).

[randomize order in which feelings are presented]

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested	1	2	3	4	5
Distressed	1	2	3	4	5
Excited	1	2	3	4	5

Upset	1	2	3	4	5
Strong	1	2	3	4	5
Guilty	1	2	3	4	5
Surprised	1	2	3	4	5
Scared	1	2	3	4	5
Hostile	1	2	3	4	5
Enthusiastic	1	2	3	4	5
Proud	1	2	3	4	5
Irritable	1	2	3	4	5
Alert	1	2	3	4	5
Ashamed	1	2	3	4	5
Inspired	1	2	3	4	5
Nervous	1	2	3	4	5
Determined	1	2	3	4	5
Angry	1	2	3	4	5
Attentive	1	2	3	4	5
Jittery	1	2	3	4	5
Active	1	2	3	4	5
Afraid	1	2	3	4	5
Proud	1	2	3	4	5
Sad	1	2	3	4	5
Happy	1	2	3	4	5

Calm	1	2	3	4	5
Worried	1	2	3	4	5
Hopeful	1	2	3	4	5

[Note: The Negative Affect subscale is created by averaging scores for “afraid,” “scared,” “nervous,” “jittery,” “irritable,” “hostile,” “guilty,” “ashamed,” “upset,” and “distressed.” The Positive Affect subscale is created by averaging scores for “active,” “alert,” “attentive,” “determined,” “enthusiastic,” “excited,” “inspired,” “interested,” “proud,” and “strong.” Additional words “angry,” “sad,” “happy,” “calm,” and “surprised” were added to provide a way to capture hostility, sadness, joviality, serenity, and surprise subscales, respectively. “Proud,” “hopeful,” and “worried” were added to provide additional measures of affect thought to be related to breast cancer messages.]

[page break]

[Perceived mammography norms; adapted from Fishbein & Ajzen, 2010]

Please rate your level of agreement with the following statements:

[injnornmmammo] Most people who are important to me think I should have a mammogram in the next two years.

1. strongly disagree
2. disagree
3. somewhat disagree
4. neither agree nor disagree
5. somewhat agree

6. agree

7. strongly agree

[injnornpostpone] Most people who are important to me think I should wait until age 50 to have a mammogram.

1. strongly disagree

2. disagree

3. somewhat disagree

4. neither agree nor disagree

5. somewhat agree

6. agree

7. strongly agree

[descnormmammo] Most women like me will have a mammogram in the next two years.

1. strongly disagree

2. disagree

3. somewhat disagree

4. neither agree nor disagree

5. somewhat agree

6. agree

7. strongly agree

[descnormpostpone] Most women like me will wait until age 50 to have a mammogram.

1. strongly disagree

2. disagree

- 3. somewhat disagree
- 4. neither agree nor disagree
- 5. somewhat agree
- 6. agree
- 7. strongly agree

[page break]

[Self-efficacy to have a mammogram; adapted from Bandura, 2006]

[efficacy] Using the following scale, please rate how certain you are that you could...

	Could not do at all					Moderately certain I could					Highly certain I could
<u>...have a mammogram in the next two years if you wanted to.</u>	0	1	2	3	4	5	6	7	8	9	10
<u>... wait until age 50 to have a mammogram</u>	0	1	2	3	4	5	6	7	8	9	10

if you wanted to.										
----------------------	--	--	--	--	--	--	--	--	--	--

[page break]

[Attitudes toward mammography]

Complete the sentence by marking your selection on the following dimensions.

[attmamm] My having a mammogram in the next two years would be...

Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Harmless
Bad	1	2	3	4	5	6	7	Good

[attwait] My waiting until age 50 to have a mammogram would be...

Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Harmless
Bad	1	2	3	4	5	6	7	Good

[page break]

[countarg1] In the space listed below, list all of the risks of having mammograms that you can think of. [open-ended]

[countarg2] In the space listed below, list all of the benefits of having mammograms that you can think of. [open-ended]

[page break]

[Attitude conviction; selected items from Abelson, 1988]

[conviction] How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	at Somewh	Neither agree nor	at agree Somewh	Agree	Strongly agree
My beliefs about mammograms express the real me.	1	2	3	4	5	6	7
I think about mammograms often.	1	2	3	4	5	6	7
I hold my views about	1	2	3	4	5	6	7

mammograms							
very strongly.							

[Demographics]

[edu] What is the highest level of education you have completed?

1. less than high school
2. high school graduate or GED
3. some college or technical school
4. college graduate or beyond

[ethnicity] Are you of Hispanic, Latino/a, or Spanish origin?

1. Yes, of Hispanic, Latino/a, or Spanish origin
2. No, not of Hispanic, Latino/a, or Spanish origin

[race] What is your race? (One or more categories may be selected.) [make this check all that apply]

1. White
2. Black or African American
3. American Indian or Alaska Native
4. Asian
5. Native Hawaiian or Other Pacific Islander

[If race is 4 or 5, continue to **subrace**. Otherwise, skip to **children**.]

[subrace] What is your sub-race/ethnicity?

1. Chinese

2. Japanese
3. Filipino
4. Hawaiian
5. Other Pacific Islander
6. Other Asian-American

[Breast Cancer Risk Factors]

Please answer the following questions related to your risk factors for breast cancer.

[children] What was your age at the time of your first live birth of a child?

1. I don't know
2. no live births
3. younger than 20 years old
4. 20 to 24 years old
5. 25 to 29 years old
6. 30 years old or older

[period] What was your age at the time of your first menstrual period?

1. I don't know
2. 7 to 11 years old
3. 12 to 13 years old
4. 14 years old or older

[biopsy] Have you ever had a breast biopsy?

1. No
2. Yes

3. Don't know

[If **no** or **don't know**, skip to **comments**. Otherwise, continue.]

[biopsy2] How many breast biopsies (positive or negative) have you had?

1. 1
2. more than 1

[biopsy3] Have you had at least one breast biopsy with atypical hyperplasia? Atypical hyperplasia is a benign (noncancerous) condition in which cells look abnormal under a microscope and are increased in number.

1. no
2. yes
3. I don't know

[**Open-ended comments**]

[comments] Is there anything else you would like to share with us? (Optional) [text box]

[**Debriefing and “thank you” text**]

Thank you for your time and participation. This survey was designed to find out what effects comments appearing with online news articles have on other readers. Some participants saw an article with comments that may have included personal stories about mammography, while others did not. The news article you may have read was an edited version of a news article that originally appeared in the *New York Times* in 2009. For current information about breast cancer prevention, screening, and treatment, please visit

<http://www.cancer.gov/cancertopics/types/breast>. If you are interested in learning more about your personal risk for breast cancer, visit <http://www.cancer.gov/bcrisktool/>.

If you have any questions about this survey, please feel free to contact Holli Seitz (hseitz@asc.upenn.edu).

Click the button below (the arrows) to finalize your survey responses and receive credit for completing the survey.

APPENDIX D

SAMPLE EXPERIMENTAL MANIPULATION

[Information in brackets was not visible to participants.]

[Instructions for NoComm:] On the following page, you will view a newspaper article about breast cancer screening. Please read it carefully. You will then be asked a series of questions.

[Instructions for conditions with comments:] On the following pages, you will view a newspaper article about breast cancer screening and comments submitted by readers. Please read them carefully. You will then be asked a series of questions.

[Composite News Article]

[Much of this text is taken from “New Guidelines Suggest Cutback in Mammograms,” *New York Times*, November 17, 2009, <http://nyti.ms/1zjqHEM>. It has been edited to shorten overall length, balance length given to each side of the argument, remove quotes and exemplars, and update guidelines.]

Breast Cancer: Who Should Be Screened?

According to guidelines released by the United States Preventive Services Task Force (USPSTF), an independent expert panel, women at average risk for breast cancer

should start regular breast cancer screening at age 50 and have mammograms every two years. But other groups disagree. The American Cancer Society advises that women at average risk for breast cancer start screening annually at age 45, and the American College of Radiology has said that it will continue to advise women to start having annual mammograms at age 40.

Over all, the USPSTF says, the modest benefit of mammograms – reducing the breast cancer death rate by 15 percent – must be weighed against the harms. Though many women do not think a screening test can be harmful, medical experts say the risks of mammograms are real. A test can trigger unnecessary further tests, like biopsies. And mammograms can find cancers that grow so slowly that they would never cause harm in a woman’s lifetime, resulting in unnecessary treatment. These harms loom larger for women in their 40s, who are more likely to experience them than women 50 and older and less likely to have breast cancer, tipping the balance of risks and benefits. The Task Force says that beginning screening at age 50 and only screening every two years reduces the risks of unnecessary tests and overtreatment. [137 words for beginning mammograms at age 50; 2 main arguments: false positives and overdiagnosis]

Despite the USPSTF recommendations, the American Cancer Society and the American College of Radiology both continue to recommend that women begin routine annual mammograms before age 50. The cancer society, in a statement, agreed that mammography had risks as well as benefits. They said that the society’s experts had

looked at “virtually all” the task force and additional data and concluded that the benefits of annual mammograms starting at age 45 outweighed the risks. These benefits include early detection, which may result in easier and less invasive treatments. Benefits also include a small reduction in cancer deaths. One cancer death is prevented for every 1,904 women ages 40 to 49 who are screened for 10 years. This reduction in deaths led the American College of Radiology to recommend that women begin annual screening at age 40. [136 words against waiting until age 50: 2 main arguments: early detection and reduction in cancer deaths]

Experts agree that different women will weigh the harms and benefits differently. Faced with these new guidelines, women are advised to talk to their doctors about their screening decisions.

Sample Comments

Each experimental condition that receives comments first viewed the composite news article. The next screen presented a series of four comments, which varied in composition. The sets of comments (samples presented in Table D1) were randomly drawn from the appropriate banks of comments and randomly ordered prior to the beginning of the experiment.

Table D1

Sample Comments by Condition

Condition	Sample comment set
FPNoEx	<p>DH 6 months ago</p> <p>I'll bet you ten to one that physicians who own mammography units will be slower to adopt the new guidelines than those refer out mammograms.</p> <hr/> <p>R.M. 6 months ago</p> <p>This attitude of many physicians - to continue with mammograms despite the new recommendations - is a good example of a big problem of American medicine and why we need health care reform to change the fee-for-service system. Because doctors are paid a fee for each service, under the current system they will continue to get paid for the mammograms and for the unnecessary tests and treatment of patients that will follow false positive tests. No matter that the tests there will be many more false positive tests than true positive tests in the age group of women 40-49. In that age group, mammograms are inefficient both in terms of promoting health and keeping costs down. But consider what would happen if the payment system were reformed payment so that doctors would be paid capitation fees for the care of their patients. In that case, they would lose profit by doing unnecessary tests and procedures. In that case, doctors would take the time and trouble to explain to their women patients 40-49 why they should not get mammograms. The result would be that fewer women would be harmed by testing false positive and the health care system would save a lot of money.</p> <hr/> <p>Anon 6 months ago</p> <p>Dr. Phillip Strax was one of the early proponents of mammography. He partnered with HIP in New York City's Research Department in the late 1960's and early 1970's to study the impact of early detection via mammography on women. Dr. Strax I was led to believe became an advocate due to a personal loss to breast cancer in his family. He and HIP tried with all their skills and lots of funding from the government to show that mammography extended (often described by the emotional term 'saved') the lives of those women in significant ways. But as with more recent reports the conclusions at best were inconclusive. What all these tests come down to is (A) putting the fear of cancer into so-called high risk people and (B) driving people to take tests as a way to increase patient and cash flow. Often we hear about the scientific method and its underlying value to distinguish allopathic medicine from all the alternatives including wellness, healthy lifestyles and improving the air, water and food we use. Americans die at alarming rates due to the very medical care received or suffer medical injury that is less consequential or eventually leads to restricted lives</p>

and death. Some claim that the number of deaths due to medical care received runs between 400,000 and 1,000,000 each and every year. More important than misinforming women about mammography, men about PSA and everyone about useless, dangerous and expensive testing is the need to start a national wellness service that increases wellness, healthy life styles and improved air, water and food. Reduce alcoholic behavior and many diseases would be reduced or eliminated. Stop smoking and heart, lung and cancer diseases would drop significantly. Fix our food and how we use it and diabetes, overweight, obesity, cancers, heart diseases and other conditions would drop also. Introduce needed supplements and many conditions including arthritis would be less common. Now do the difficult thing: THINK about wellness.

swm 6 months ago

One way to get a great 5 year survival rate is to unnecessarily treat healthy women who would have otherwise been just fine had never been told they had "cancer." Treating as many patients as we do in the USA, most unnecessarily, also gives the impression (falsely) that all breast cancer is curable. For those interested, Lancet Oncology reported in July 2008 that the U S had the highest national 5 year breast cancer survival rate. Do you think that maybe, somehow, perhaps this had something to do with an aggressive screening program?

BCNoEx DH 6 months ago

I am always surprised that breast cancer awareness campaigns, and articles always look at screenings, detection, research into technologies and medications to "eradicate" the cancer...but they rarely take a strong look at the pollutants in our world today that are finding their way into women's breast tissue. In my opinion, campaigns for clean water, clean air, organic food, natural beauty care products...all of these campaigns should join forces with breast cancer prevention and awareness - or actually in fact, the other way around - since women's awareness in this country of the issue of breast cancer is so strong and the pink-ribbon is so well known, what better way to grab national attention about the bigger picture of the toxic environment that we live in and raise our children in than to have the breast cancer organizations start to raise our awareness of prevention through creating a healthier environment.

R.M. 6 months ago

And how does our pannel want young women to be screened, to prevent them from falling through the cracks? What about the 35 year old woman whose breast cancer races to stage 3 in 6 months because her hormones are appropriately active?

Anon 6 months ago

One thing that is not always taken into account is that advanced breast cancers are being seen more and more in younger women - who are too young to get a mammogram. The mammogram could not decrease the number of advanced cancer diagnosis if those with the cancer are not actually getting mammograms. Older women may be getting diagnosed early because of the mammogram.

swm 6 months ago

If I were a female, this news would make me want to continue having mammography, but instead of reaching for surgery at the first finding of a lump, I would wait until a later mammography to decide whether the lump required immediate or deferred action. As a male beyond the age of 40, I'm well aware that PSA spikes (which I have experienced), may be short lived, and may be meaningless ... certainly nothing to risk surgery and possible loss of sexual function over.

FPEX DH 6 months ago

Women encounter two fears that shake them with regard to the new recommendations. There is, most obviously, dread of Cancer; the fact that many cancers may be slow-growing and non-life-threatening does little to ameliorate that dread. The second fear is that of relegation to second-class citizen. The inroads made by womens' liberation are not so substantial that there is no slippery slope. There lurks a sad suspicion that women are still expendable, that the medical community pays less attention to women than to men and sees less need to be truly careful of them. Only when both of these perceptions die out will recommendations of the sort now put forth be regarded with more rationality than emotion.

R.M. 6 months ago

After an experience a few years ago, at age 52, during which I was given several mammograms and two different biopsies, including a surgical one, over the course of approximately five months I was left traumatized by the experience. Following the last procedure, I was basically told "never mind". Even if cancer had been found, it would have been the type that I would "die with" rather than "die of". Although I was thrilled not to have any cancer, the fear and anxiety caused by this entire experience was overwhelming. I consider myself a victim of needless invasive medical malpractice. I no longer have mammograms nor do I do self-exams and my trust in modern medicine in general remains greatly diminished.

Anon 6 months ago

I'm 57 and have had mammograms every 3- 5 years since I was 40. I have no family history of breast cancer and none of the other risk factors. Every time I get the test I have to go back to be tested again. They have never found anything, but this period of waiting is a big waste of time, causes a great deal of anxiety and I also worry about the cumulative effects of so much radiation giving me cancer. 6 months ago when I had my last mammogram the woman who operated the equipment nearly cried when I told her that I hadn't had the procedure in 3 years. "Why, why, why did you wait so long?" she looked at me her eyes tearing. The people who support the mammogram industry act like they are in a cult. Why isn't breast cancer or any other cancer for that matter detectable in a blood test?

swm 6 months ago

I am 45 and have had 2 mammograms since I turned 40. After reading a lot of the research, I decided to have a mammogram only every other year. My 2nd mammogram experience was a nightmare. The technician who performed the mammogram was cold, unfriendly, and seemed hurried. The next day, she called me to say that the result was "suspicious" and I needed to come in as soon as possible for a follow up. She would not give me any other information; she wouldn't even tell me which breast was abnormal. Her voice on the phone was like ice. I was in a complete panic and spent the next 24 hours crying and thinking that I was going to die. Even though I found some reassuring information on the internet, I also found a lot that terrified me. So, I went in the next day and had a diagnostic mammogram. Luckily, this time I got a different technician. She was much kinder and more patient, and did a thorough job positioning me in the machine. Waiting there for the radiologist to review my scans was the longest 15 minutes of my life. The outcome? Negative. The technician explained to me that probably some tissue had overlapped in my breast during the first scan, because my breast was not sufficiently compressed. (The hurried technician...) I have decided I won't have another mammogram until I'm 50.

BCEX DH 6 months ago

The recommendations of not getting mammograms and not doing breast self exams is completely about the insurance companies saving money. They will save millions. And then there is us. Well, for one, I would be dead. DEAD. I am a survivor and it is because of breast self exams and mammograms.

R.M. 6 months ago

Women are being advised to discuss the pros and cons of having a mammogram before getting one automatically at age 40. What is so controversial about having a woman be informed of her choices before making a medical decision?

Anon 6 months ago

No family history, never smoked and not overweight, I had a small, but invasive breast cancer found by an alert doctor screening a mammogram. so here I am, almost 17 years later...do as you wish and best of luck.

swm 6 months ago

Bad, bad idea. I was diagnosed at age 46 with a tiny but extremely aggressive cancer via mammogram; it could not be felt in an examination. My last mammogram (totally 'clean') had been eighteen months before; now the cancer had already spread to the lymph nodes. After surgery, chemo, and radiation, my predicted 10-year survival chances are 92%. If I had waited until age 50...by that time the cancer would probably had already metastasized and I would be facing a death sentence. Women, don't die needlessly. Have your first mammogram at age 40 or below (some doctors recommend starting at age 35) and keep having them every year. It could save your life. I know it saved mine.

FPEXRem DH 6 months ago

It is far too naive to make a blanket statement that private insurance companies will continue to support mammography for women under 50 at low risk for breast cancer. They may do it now as a public relations type move but these companies, for the most part, bend over backwards to maximize profits. No one knows what will happen in the future as far as their policies.

R.M. 6 months ago

Women have been harmed, and I bet they agree with this recommendation. These women have had radiologists tell them that an abnormality in their mammogram was "99% probability benign" but still recommend a biopsy. After weeks of anxiety and unnecessary surgery, they now have permanent titanium foreign bodies in their breasts from the biopsies and each radiologist and hospital is several thousand dollars richer. This is not effective use of our health care dollars. It is CYA medicine.

Anon 6 months ago

Women have been persuaded to undergo biopsies because mammograms showed "changes" in micro-calcifications. The biopsies that prove negative subject these women to invasive surgery, the costs of second opinions, scarred breasts, and psychological terror over a period of months. These women have probably decided to have mammograms less often as a result. I am convinced that while many doctors are quite earnest in their concerns, others are cynically simply pulling in more fees for the institutions they work for, usually large hospitals.

swm 6 months ago

Yes, I certainly agree with this. Mammograms can cause harm - emotional, physical, and financial harm. Women may have a mammogram that comes back with "suspicious calcifications" in one spot. They go back in for more views, and an ultrasound. They have needle biopsies. Still nothing conclusive. Some doctors may even suggest that they have the area surgically removed. Some of these women take the "watch and wait" option instead and nothing changes over a number of years - in fact, for some, the "suspicious calcifications" area seems to disappear. They are told that they should feel lucky and grateful that they didn't have breast cancer after all that. Strangely, many don't feel lucky; they feel suspicious about the whole medical-industrial system. For every real microscopic cancer found, how other many hundreds of women will undergo numerous costly tests and be given unneeded surgery because of some tiny undefined spot? How about all the emotional and psychological pain of being put on that medical testing treadmill? It's like they give you one test, which leads another test, which leads to more tests, or to a drug, which leads to another drug. It's no wonder our medical system is so costly.

BCExRem DH 6 months ago

What one needs to understand with these new guidelines is that it acknowledges not that screening is useless, but that the tools with which we do screen are not adequate at this point. Currently there are no good predictive biomarkers that would stratify women into groups that would and would not benefit from early mammograms. A large percentage of women diagnosed in the 40s with breast cancer had no "risk factors" - again meaning that we probably don't understand risk factors enough. Clinical discoveries, in particular in the area of diagnosis, are developing rapidly today, as we do understand genetic and genomic risk factors more readily. The hope could be that in the near future better technology will make screening more accurate, and stratification more possible.

R.M. 6 months ago

Bad, bad idea. Women in their 40s can be diagnosed with extremely aggressive cancer via mammogram; these tumors may not be able to be felt in an examination. Some of these women may have even had clean mammograms in the last two years, only to then find cancer that has already spread to the lymph nodes. After surgery, chemo, and radiation, these women have a predicted 10-year survival chances above 90%. If they had waited until age 50...by that time the cancer would probably had already metastasized and they would be facing a death sentence. Women, don't die needlessly. Have your first mammogram at age 40 or below (some doctors recommend starting at age 35) and keep having them every year. It could save your life. It has saved others.

Anon 6 months ago

Good for all of you for whom this is an intellectual exercise. You're lucky. I can only tell you what happens to women who are diagnosed with cancer. Every year, women in their late 40s, with no family history and no symptoms, are being diagnosed with early stage breast cancer after having routine annual mammograms. They may have to have a lumpectomy and radiation. If these women waited until they felt a lump, or if their first screening had come at 50, I doubt their cancer would be found at an early stage. You can manipulate statistics in many ways...but these women probably have a different viewpoint and will take the mammograms.

swm 6 months ago

Breast cancer survivors are probably glad they had yearly mammograms. Some of these women may have had tumors that were low-grade, well differentiated, and small. But why would they want to wait until they or another could palpate the cancer and surgery would require more removal of breast tissue and more disfigurement.? That counts for something. Waiting could also result in a greater chance of lymphodema if lymph node dissection is required.. Even mild lymphodema is a pain. Most breast cancers, I believe 70-80%, break out of the milk ducts which makes them life threatening at some point. Why wait? It's not like the majority of prostate cancers which I understand grow so slowly that most men will die of something else. Survivors WANT to survive and early detection and treatment is physically and mentally justifiable.

Note. Conditions are as follows: NoInfo = no information control, NoComm = no comments control, FPNoEx = false-positive comments without exemplars, BCNoEx = mammogram-detected breast cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected breast cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected breast cancer comments with exemplars removed.

APPENDIX E

EXPERIMENTAL COMMENT POOLS

To construct sets of comments with the content and valence needed for each condition, as outlined in Table 4.1, comments were randomly drawn from seven pools of comments with 15 comments in each pool: user-generated false positive comments without exemplars, user-generated false positive comments with exemplars, false positive comments that were rewritten to remove exemplars but preserve content, length, and reading level, user-generated mammogram-detected cancer comments without exemplars, user-generated mammogram-detected cancer comments with exemplars, mammogram-detected cancer comments that were rewritten to remove exemplars but preserve content, length, and reading level, and neutral comments with no exemplars. These full comment pools are included below in Tables E1 through E6.

Table E1

User-Generated False-Positive Comments Without Exemplars

Comment text	Readability (Flesch Kincaid reading ease)	Length (in words)
I recently read (in a book entitled <i>The Estrogen Errors</i> , if you're interested) that the error rate in interpreting mammograms is amazingly high. Even if the test itself is theoretically reliable and useful, the chances it's being read accurately are not that good.	39.2	45
Consider that every time you get a mammogram you increase the risk of getting breast cancer by 2 percent so in 10 years you've increased the risk by 20 percent. Moreover, 70 to 80 percent of all positive mammograms do not, upon biopsy, show	50.6	71

any presence of cancer. Probably more effective in the prevention of breast cancer is vitamin D3 intake (it is not actually a vitamin but a hormone).

People need to realize that when they agree to a screening test, whatever it is, for heart disease, prostate cancer or breast cancer, the overwhelming likelihood is that it will not help them as an individual. Screening is like a lottery, there are many players, but very few "winners." The medical community needs to communicate better the true risks and gains from screening. If those who offered screening, that is, doctors, actually paid for the screening test themselves, I bet we'd see much less unnecessary screening of dubious benefit.

47.7 90

One way to get a great 5 year survival rate is to unnecessarily treat healthy women who would have otherwise been just fine had never been told they had "cancer." Treating as many patients as we do in the USA, most unnecessarily, also gives the impression (falsely) that all breast cancer is curable. For those interested, Lancet Oncology reported in July 2008 that the U S had the highest national 5 year breast cancer survival rate. Do you think that maybe, somehow, perhaps this had something to do with an aggressive screening program?

49.5 93

The time has come to take down the tacky pink ribbons and end Breast Cancer Awareness Month. Early detection does not save lives -- it leads to overdiagnosis and overtreatment. The thousands of mammogram screening programs in the US provide no benefit to women but are a huge source of revenue for the breast cancer industrial complex. Mammogram screening programs and the unnecessary treatment of harmless conditions are a primary reason why our healthcare costs are the highest in the world but our healthcare outcomes are the lowest in the developed world. Let us shout from the rooftops that the emperor has no clothes.

52.9 103

For many treatments, but most especially for topical issues like breast or prostate cancer, we have allowed "common sense", strongly held or stated opinion or self-interest to guide recommendations. Only data should be used. Where the answer is "we don't know", such should be stated. Fears that this report will reduce mammograms assumes that mammograms are beneficial. The plural of anecdote is not data. All screening tests are a balance of benefit (lifespan or quality of life improved) and harms (costs, risks, discomfort, anxiety, false negatives or positives). Let us try to keep personal stories, opinions or wishes ("It should work!") out of this. What we really need are more studies (signal) not more media frenzy (noise).

59.8 119

<p>The whole point of this discussion is not denying that there are some cases found that save some peoples lives but that many many more people undergo unnecessary treatment and often are harmed by it. In addition the cost of over-screening is large for the nation as a whole. There is always a balance that has to be struck, and there will always be some that live or die as a result of that balance. It is the same in everything we do in life trying to protect people from threats. The main thing is that researchers are more and more coming to the conclusion that mammography is being overused and the trade-offs need to be discussed openly.</p>	65.4	120
<p>there are a lot of women who use this information to say, well, I'll just never have a mammogram... which is hardly the message that one should take --. But this is the message. Screening mammograms lead to unnecessary followup testing, higher diagnosis rates of tiny masses of indolent cells that would never have been a problem, unnecessary invasive treatments, and most clearly do NOT save lives. At this point, unfortunately, there is a whole industry of mammography, from charities raising funds that could have gone to worthwhile projects to screening clinics to treatment centers. This juggernaut is difficult to stop, especially when so many people have careers invested, and when so many women sincerely but falsely believe that screening saved them.</p>	50.3	122
<p>The more "information you have about your own body" that comes from someone else, the more likely THEY are to want to DO THINGS TO YOU. Most of which will do you no good. Take routine prostate screening. Millions of men have had their prostates removed, with all the side effects that causes, when watchful waiting would have likely done just as well. Maybe some of them were saved from death, but statistically, the death rate from prostate cancer hasn't changed. In other words, we are doing more testing, more procedures and surgeries, but we are not changing the number of people who die from cancer. Just messing with those who wouldn't have died anyway, and raising the cost of health care. Same with breast cancer. More breast irradiation, more tests, more biopsies, not really very many more women saved. And truthfully, even if you look at the comments here, you will discover many women, if not most, find their own tumors when they examine their own breasts. Not a doctor. Not a machine. YOU.</p>	80.2	177
<p>The data was never very good about annual mammograms. Medicine often picks up a treatment or technology before "prime time" because it seems it ought to work. There are many</p>	73.7	186

therapies and beliefs in medicine that have not held up under good studies. Why? Because we don't know a lot about the complex human body. We are better but we don't know everything. In almost 35 years of medicine I have seen a lot come and go. We do our best but when we can prove that a treatment (or an intervention of any sort) does no good or does harm, we should rethink its use. Not that cost is not a factor in screening programs. It always has been. But should we spend 100 million dollars a year on 100 people to save one life over a ten year period? An exaggeration perhaps but it makes the point that our system has limits. Better to spend the limited money we have on things that work, like immunization programs and better delivery of healthcare. There is no need to see a conspiracy in this.

This attitude of many physicians - to continue with mammograms despite the new recommendations - is a good example of a big problem of American medicine and why we need health care reform to change the fee-for-service system. Because doctors are paid a fee for each service, under the current system they will continue to get paid for the mammograms and for the unnecessary tests and treatment of patients that will follow false positive tests. No matter that the tests there will be many more false positive tests than true positive tests in the age group of women 40-49. In that age group, mammograms are inefficient both in terms of promoting health and keeping costs down. But consider what would happen if the payment system were reformed so that doctors would be paid capitation fees for the care of their patients. In that case, they would lose profit by doing unnecessary tests and procedures. In that case, doctors would take the time and trouble to explain to their women patients 40-49 why they should not get mammograms. The result would be that fewer women would be harmed by testing false positive and the health care system would save a lot of money.

56.6 205

Heart disease is the number one killer of men and women. Less is known about how to treat women who suffer from heart disease (and about how to detect it) because most trials were conducted on men. While the breast cancer awareness folks have done an admirable job ensuring we are aware of the risks of (and spend more money on) breast cancer detection than just about anything else (including other, more fatal cancers), the statistics do not support the concept of spending that much time, effort and funds to save so (relatively) few when they might more effectively be spent on other health screening that would

40.7 216

save more lives. The new breast cancer screening recommendations say that women with a family history of breast cancer SHOULD work with their physicians to determine when it's best to begin mammograms. For some of the rest of us -- who have faithfully done what we were guided to do and have endured radiation exposure, angst and painful and invasive procedures to prove normal calcifications are not in fact cancer -- the new guidelines make eminent sense. Not to diminish the fear some women honestly feel about getting breast cancer, how much of that fear might be attributed to the persistent, alarming, funds-seeking ways of breast cancer awareness groups?

It's time to reassess not only routine mammogram screening, but also the universal adoption of expensive, flawed screening tests that lead to unnecessary procedures and angst. Why were we so quick to embrace a measure that costs 3.6 billion/yr (with the unnecessary biopsies, mastectomies, chemo and radiation it's likely over 4 billion) but provides little measurable benefit? I don't believe that there is a vast conspiracy in place to bilk insurers, but mammography (like PSA) screening seems a poor use of our health care dollars. The problem is complicated.

Women whose family or friends have had breast CA, as well as survivors concerned about reoccurrence are anxious and vulnerable. Even after negative biopsies, many patients remain fearful. Radiation and chemo are terrible to endure. The cost of a poor screening program is high. Part of the answer may lie in carefully evaluating the sensitivity and specificity of screening tests in general populations before universal adoption.

Evaluations must be balanced. Radiologists performing high volumes of mammograms and survivors convinced that a mammogram result helped them are not well suited to objectively evaluate the test. The American Cancer Society needs to stop acting like a pseudo-scientific lobbying group.

Not all cancer screening is beneficial. PSA demonstrably wasn't, but it took decades for ACS to drop its support of PSA screening. How many billions should we invest in mammography in the next decade?

44.7

237

I think women need to be very careful with cancer screening.

We get incomplete and biased information, slogans, scare campaigns and orders, you "should", you "must"...provided by a toxic mix of vested interests and politics who don't IMO, care about women. I'm constantly shocked by the dishonesty/unethical conduct of these programs and the medical profession. Most programs are not evidence based and are far more likely to harm us. If women want to test, consider an

51.7

251

evidence based program, the Dutch and Finns have evidence backed cervical screening. The Nordic Cochrane Institute (NCI) have produced a brochure on, "The Risks and Benefits of Mammograms", it's at their website. Be very careful accepting recommendations, especially in countries that engage in non-evidence based screening, who push medical excess, and ignore informed consent (and even consent itself), like the States and Australia. Pap testing is not a clinical requirement for the Pill. The NCI tell us about 50% of screen detected breast cancers are over-diagnosed and any benefit of screening is wiped away by women dying from lung cancer/heart attacks after treatment with radiotherapy/chemo. So, the risks exceed any benefit. The Dutch will scrap population pap testing and offer instead 5 HPV primary tests or HPV self-testing at ages 30,35,40,50 and 60 and ONLY the roughly 5% who are HPV+ will be offered a 5 yearly pap test. Most women are having unnecessary pap testing and risking excess biopsies/over-treatment.

Dr. Phillip Strax was one of the early proponents of mammography. He partnered with HIP in New York City's Research Department in the late 1960's and early 1970's to study the impact of early detection via mammography on women. Dr. Strax I was led to believe became an advocate due to a personal loss to breast cancer in his family. He and HIP tried with all their skills and lots of funding from the government to show that mammography extended (often described by the emotional term 'saved') the lives of those women in significant ways. But as with more recent reports the conclusions at best were inconclusive. What all these tests come down to is (A) putting the fear of cancer into so-called high risk people and (B) driving people to take tests as a way to increase patient and cash flow. Often we hear about the scientific method and its underlying value to distinguish allopathic medicine from all the alternatives including wellness, healthy lifestyles and improving the air, water and food we use.

Americans die at alarming rates due to the very medical care received or suffer medical injury that is less consequential or eventually leads to restricted lives and death. Some claim that the number of deaths due to medical care received runs between 400,000 and 1,000,000 each and every year. More important than misinforming women about mammography, men about PSA and everyone about useless, dangerous and expensive testing is the need to start a national wellness service that increases wellness, healthy life styles and improved air, water and food. Reduce alcoholic behavior and many diseases would

52.2

332

be reduced or eliminated. Stop smoking and heart, lung and cancer diseases would drop significantly. Fix our food and how we use it and diabetes, overweight, obesity, cancers, heart diseases and other conditions would drop also. Introduce needed supplements and many conditions including arthritis would be less common. Now do the difficult thing: THINK about wellness.

Average	54.3	157.8
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Table E2

User-Generated False-Positive Comments with Exemplars

Comment text	Readability (Flesch Kincaid reading ease)	Length (in words)
I have had the mandatory mammograms. Always show lump in my dense breasts. Then have ultrasound that shows its nothing - they think. I then have to make a huge fuss to avoid every second mammogram because of the protocol that says it comes first. All that extra radiation for nothing.	71.5	50
I am one of the women who was harmed, and I agree with this. My radiologist at Lenox Hill told me I had an abnormality in my mammogram that was "99% probability benign" but still recommended a biopsy. Two weeks of anxiety and one unnecessary surgery later, I now have a permanent titanium foreign body in my breast and both she and the hospital are several thousand dollars richer. This is not effective use of our health care dollars. It is CYA medicine.	55.4	83
15 years ago, I was also persuaded to undergo a biopsy because the mammogram showed "changes" in micro-calcifications. The biopsy proved negative but subjected me to invasive surgery, the costs of second opinions, a scarred breast, and psychological terror over a period of nearly two months. I am convinced that while many doctors are quite earnest in their concerns, others are cynically simply pulling in more fees for the institutions they work for, usually large hospitals. I have since restricted my mammograms to once every 3-4 years.	39.8	89
the whole breast cancer industrial complex is suspicious...all the pink, all the walks and runs, all the mammograms, but after all the billions of dollars it's still as deadly as ever, but with a	58.6	93

strong genetic component. My wife was a faithful screener, but also very vulnerable to stress, and each year her mammogram put her through a few weeks of hell, not to mention two useless biopsies that scarred her mentally and physically. The many studies showing the harmful results of stress should get as much attention as any others.

My last mammogram showed something suspicious. I was rushed into an ultrasound for better diagnosis. Then a biopsy and it turned out to be nothing. Nothing except \$900 out of my pocket. Every other year is fine with me. Maybe every second year even. I blame the insurance companies for pushing all of the "preventive wellness" testing done. Supposedly to save them money - which is untrue. My grandmother refused mammograms. She also refused to have a mole removed from her face that the doctors told her would soon become cancerous if not removed. My beloved grandma passed away at the age of 92, with the mole intact and never a mammogram.

Years ago I had a false alarm from a routine screening mammogram. It took a month to learn that the technician had not done the mammogram correctly -- a month of pure hell for me. I was in my early 40s and had elementary school- age children. Ironically, the several compounded mistakes that delayed the " all-clear" ultimately were chalked up to the fact that my initial screening and subsequent, delayed diagnostic exam were performed during October, "Breast Cancer Awareness" month. The clinics had hired badly trained temporary workers to handle the additional women who came in during the "awareness" month. These badly trained workers made several mistakes in my case that weren't uncovered until my ordeal finally ended.

No one mentioned the impact the refusal of women to get regular mammograms would have on the income of doctors and imaging clinics. It would be devastating for them. I noticed many years ago that my mammograms always had to be repeated after a proper period of sleepless nights. Nevertheless, I had mammograms because my doctor would not let me have the hormone replacement therapy she told me I could not live without until I had that mammogram first. I no longer take advise from doctors, I am 72 and I am doing what kept my relatives alive and healthy in to their 80s and 90s - I stay away from doctors unless I have a broken bone or an open wound..

After an experience a few years ago, at age 52, during which I was given several mammograms and two different biopsies, including a surgical one, over the course of approximately five

months I was left traumatized by the experience. Following the last procedure, I was basically told "never mind". Even if cancer had been found, it would have been the type that I would "die with" rather than "die of". Although I was thrilled not to have any cancer, the fear and anxiety caused by this entire experience was overwhelming. I consider myself a victim of needless invasive medical malpractice. I no longer have mammograms nor do I do self-exams and my trust in modern medicine in general remains greatly diminished.

I'm 57 and have had mammograms every 3- 5 years since I was 40. I have no family history of breast cancer and none of the other risk factors. Every time I get the test I have to go back to be tested again. They have never found anything, but this period of waiting is a big waste of time, causes a great deal of anxiety and I also worry about the cumulative effects of so much radiation giving me cancer. 6 months ago when I had my last mammogram the woman who operated the equipment nearly cried when I told her that I hadn't had the procedure in 3 years. "Why, why, why did you wait so long?" she looked at me her eyes tearing. The people who support the mammogram industry act like they are in a cult. Why isn't breast cancer or any other cancer for that matter detectable in a blood test?

71.3 159

So, OK -- mammograms don't work. We've been sold a bill of goods, billions down the drain for no protection. And before that, self-exams -- pushed EXTREMELY for DECADES by doctors, nurses, hospitals, advertising, cancer organizations -- all a waste of time. Even when done by a doctor. How many times did my OB-GYN yell at me -- do your self exams...get your mammogram....so I did. Faithfully. Since age 35. It did find a couple of small benign tumors in the first one at 35 -- had them removed -- never came back. So, I'm onto 20 years of having mammograms, all but the first "clean" -- I guess they did no good. How much radiation have I had unnecessarily???? And the worst thing, not mentioned here: this was all sold to American women with the idea that we could SAVE OUR OWN LIVES by early detection and prevention....how'd that work out? Epic fail. Now that means -- THERE IS NOTHING, absolutely nothing, YOU CAN DO TO PREVENT BREAST CANCER. Just sit there...wait until you get it....then die.Thanks, Medical Establishment, for nothing.

79.6 186

I have learned that in many instances, the medical establishment often provides conflicting advice, almost guess-like. I also have declined mammograms, having had only two by age 56, both required before an overseas posting. I get annual reminders

46.6 191

which go ignored as there has been no breast cancer in my family and a sister underwent a frightening month before a false positive biopsy determination. I have also taken the same approach to physicals, typically getting one every five years or so, usually when required by overseas postings. While I haven't needed to do much medical research into specific conditions, I have done lots of research into nutrition after seeing Food, Inc. and have been stunned by the wealth of misinformation bandied about by the government and corporations on which the medical establishment is mostly silent, even though nutrition affects the most basic standard of health. Since moving to a whole food, plant-based diet, my family hasn't even suffered a cold in three years. I wish we could get a break on health insurance that we do as safe drivers from auto insurers, since we rarely use it....

Yes, I can certainly relate to (and agree with) this.

62.8

215

Mammograms can cause harm - emotional, physical, and financial harm. It's been about 12 years now for me; I had a mammogram that came back with "suspicious calcifications" in one spot. I went back in for more views, and an ultrasound. I had needle biopsies. Still nothing conclusive. I remember a doctor suggesting that I have the area surgically removed. I took the "watch and wait" option instead. I've been waiting now for 12 years and nothing has changed - in fact the "suspicious calcifications" area seems to have disappeared. I'm told that I should feel lucky and grateful that I didn't have breast cancer after all that. Strangely I don't feel lucky; I feel suspicious about the whole medical-industrial system. For every real microscopic cancer found, how other many hundreds of women will undergo numerous costly tests and be given unneeded surgery because of some tiny undefined spot? How about all the emotional and psychological pain of being put on that medical testing treadmill? It's like they give you one test, which leads another test, which leads to more tests, or to a drug, which leads to another drug. It's no wonder our medical system is so costly.

I am 45 and have had 2 mammograms since I turned 40. After reading a lot of the research, I decided to have a mammogram only every other year. My 2nd mammogram experience was a nightmare. The technician who performed the mammogram was cold, unfriendly, and seemed hurried. The next day, she called me to say that the result was "suspicious" and I needed to come in as soon as possible for a follow up. She would not give me any other information; she wouldn't even tell me which breast was abnormal. Her voice on the phone was like ice. I

68.6

238

was in a complete panic and spent the next 24 hours crying and thinking that I was going to die. Even though I found some reassuring information on the internet, I also found a lot that terrified me. So, I went in the next day and had a diagnostic mammogram. Luckily, this time I got a different technician. She was much kinder and more patient, and did a thorough job positioning me in the machine. Waiting there for the radiologist to review my scans was the longest 15 minutes of my life. The outcome? Negative. The technician explained to me that probably some tissue had overlapped in my breast during the first scan, because my breast was not sufficiently compressed. (The hurried technician...) I have decided I won't have another mammogram until I'm 50.

I was a victim of an over zealous system designed to over diagnose breast cancer and profit from the measures necessary to treat it. In 2006, at age 43 had my first mammogram. I was subsequently called back to have a 2nd screening done based on something that looked abnormal. After the 2nd level of screening, was told I needed a biopsy. I first had a radiologist insert a needle gun into my breast and inject a small pea size metal pellet at the exact site of the abnormal looking breast tissue. This was done as a marker for the biopsy and to pull out a very small amount of tissue to send to the lab. Long story short, the very small biopsy was inconclusive, but the experience was dreadful. The radiologist hit an artery and I lost a lot of blood there on the table. It left the whole right side of my chest bruised. Next, I scheduled my "biopsy" which I thought would be a simple procedure in-office. However, I found out what they were calling "biopsy" was actually referred to by surgeons as a lumpectomy. This required it be done in a hospital under general anesthesia. When all was said and done, the diagnosis was not cancer, but rather a fibro-adenoma. In other words, nothing to be concerned with. As a result, I now have a permanent scar on my right breast and I no longer have symmetry, which has been very disturbing to me and has eroded my confidence.

64.8

255

I have been baffled at the volume of physicians who came out with knee-jerk reactions to this study--a surprising anti-intellectual response. I think there are two things operating there: 1) many physicians took the minimum statistics required, and forgot most of it, and do not have a very good understanding of probability and statistics, and 2) there's a well-known psychological bias that causes people to overestimate the likelihood of an event if they have had a personal experience of

55.8

341

that event. Hence, the "it happened to one of my patients so it must be something everyone should be concerned about" attitude. General public has this problem too. The "my mother/sister/aunt/friend/teacher had this happen, so I need to be concerned about it as well"• . If we're going to use this as a rationale for potentially invasive screening, we should be getting routine lumbar punctures to screen for MS, or having routine EKGs to screen for potential heart problems. I think there's a case to be made for "enough". And yes, I know people who have met an untimely end to breast cancer. They all were either in a population that doesn't get screened at all (20s) or had been having mammograms routinely that nevertheless didn't uncover the cancer until it was too late. I had a false positive on my first mammo, and my second, and my third. I did a pile of research and arrived at the conclusion that fibrocystic breasts were much more likely than any cancerous condition. And I resisted and will continue to resist a biopsy. I have also concluded that even if this "suspicious"• mass in my breast IS cancer, I will not do anything about it-- it hasn't been changing for years, and if it is cancer, it's clearly one of the super slow-moving and possibly never a problem cancers. The personal costs of getting it treated well outweigh any shreds of concern I might have over it.

Average	59.8	158.2
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Table E3

False-Positive Comments (from Table E2) Rewritten to Remove Exemplars but Preserve Content

Comment text	Readability (Flesch Kincaid reading ease)	Length (in words)
Some women have had the mandatory mammograms that then show lumps in their dense breasts. Then they have ultrasounds that show its nothing - the doctors think. Then women have to make a huge fuss to avoid every second mammogram because of the protocol that says it comes first. All that extra radiation for nothing.	67.8	54

<p>Women have been harmed, and I bet they agree with this recommendation. These women have had radiologists tell them that an abnormality in their mammogram was "99% probability benign" but still recommend a biopsy. After weeks of anxiety and unnecessary surgery, they now have permanent titanium foreign bodies in their breasts from the biopsies and each radiologist and hospital is several thousand dollars richer. This is not effective use of our health care dollars. It is CYA medicine.</p>	42.4	78
<p>Women have been persuaded to undergo biopsies because mammograms showed "changes" in micro-calcifications. The biopsies that prove negative subject these women to invasive surgery, the costs of second opinions, scarred breasts, and psychological terror over a period of months. These women have probably decided to have mammograms less often as a result. I am convinced that while many doctors are quite earnest in their concerns, others are cynically simply pulling in more fees for the institutions they work for, usually large hospitals.</p>	35.9	83
<p>the whole breast cancer industrial complex is suspicious...all the pink, all the walks and runs, all the mammograms, but after all the billions of dollars it's still as deadly as ever, but with a strong genetic component. Some women are faithful screeners, but also very vulnerable to stress, and each year their mammograms put them through a few weeks of hell, not to mention useless biopsies that scar them mentally and physically. The many studies showing the harmful results of stress should get as much attention as any others.</p>	58.2	91
<p>Some women have a mammogram that shows something suspicious and are rushed into an ultrasound for better diagnosis. Then a biopsy and it turns out to be nothing. Nothing except \$900 out of their pocket. Every other year is fine. Maybe every second year even. I blame the insurance companies for pushing all of the "preventive wellness" testing done. Supposedly to save them money - which is untrue. There are women who have refused mammograms. They may have also refused things like having pre-cancerous moles removed. These women then go on to live to old ages, with suspicious moles intact and having never had a mammogram.</p>	65.2	106
<p>Women can have false alarms from routine screening mammograms. In some cases, it's because technicians have not done the mammogram correctly, but it can take a month to figure this out -- a month of pure hell. Some of these women are in their early 40s and have elementary school- age children.</p>	53.7	116

Ironically, sometimes the mistakes that delay the " all-clear" can be chalked up to the fact that many screenings and diagnostic exams are performed during October, "Breast Cancer Awareness" month. The clinics hire badly trained temporary workers to handle the additional women who come in during the "awareness" month. These badly trained workers can make mistakes that may not be discovered until much later.

No one mentioned the impact the refusal of women to get regular mammograms would have on the income of doctors and imaging clinics. It would be devastating for them. I've noticed that for some women, mammograms always have to be repeated after a proper period of sleepless nights. Nevertheless, these women have mammograms because their doctors have told them they have to for one reason or another. These women may want to no longer take advise from doctors, but instead may do what keeps people alive and healthy in to their 80s and 90s - stay away from doctors unless they have a broken bone or an open wound..

59.7 109

Women in their early 50s can have experiences where they are given several mammograms and multiple biopsies, including surgical ones, over the course of several months. These women are left traumatized by their experiences. Then, following these procedures, they are basically told "never mind". Even if cancer had been found, it would have been the type that they would "die with" rather than "die of". Although these women are probably thrilled not to have any cancer, the fear and anxiety caused by this entire experience is overwhelming. I consider these women victims of needless invasive medical malpractice. These experiences probably lead them to no longer have mammograms or do self-exams and their trust in modern medicine in general likely remains greatly diminished.

50.8 123

There are some women who are in their late 50s and have had mammograms every 3- 5 years since they were 40. They have no family history of breast cancer and none of the other risk factors, yet every time they get the test they have to go back to be tested again. The radiologists never find anything, but this period of waiting is a big waste of time, causes a great deal of anxiety and I also worry about the cumulative effects of so much radiation giving these women cancer. I've heard of women being asked by technicians with tears in their eyes why they haven't had the procedure in several years , "Why, why, why did you wait so long?" The people who support the mammogram industry act like they are in a cult. Why isn't

60.5 154

breast cancer or any other cancer for that matter detectable in a blood test?

So, OK -- mammograms don't work. We've been sold a bill of goods, billions down the drain for no protection. And before that, self-exams -- pushed EXTREMELY for DECADES by doctors, nurses, hospitals, advertising, cancer organizations -- all a waste of time. Even when done by a doctor. How many times are women yelled at by their OB-GYNs -- do your self exams...get your mammogram....so they do. Faithfully. Some since their mid-30s. Some of these women have had small benign tumors removed that never came back. So, they're onto 20 years of having mammograms, most of them "clean" -- I guess they did no good. How much radiation have they had unnecessarily???? And the worst thing, not mentioned here: this was all sold to American women with the idea that we could SAVE OUR OWN LIVES by early detection and prevention....how'd that work out? Epic fail. Now that means -- THERE IS NOTHING, absolutely nothing, YOU CAN DO TO PREVENT BREAST CANCER. Just sit there...wait until you get it....then die.Thanks, Medical Establishment, for nothing.

78.5

181

I have learned that in many instances, the medical establishment often provides conflicting advice, almost guess-like. Some women have declined mammograms, or have maybe had only a couple when they were required for some reason. They may choose to ignore annual reminders because they have no breast cancer in their family or they know someone who has had a frightening false positive biopsy determination. Some women have also taken the same approach to physicals, typically getting one every five years or so, usually when required for work . While I haven't needed to do much medical research into specific conditions, I have done lots of research into nutrition after seeing Food,Inc. and have been stunned by the wealth of misinformation bandied about by the government and corporations on which the medical establishment is mostly silent, even though nutrition affects the most basic standard of health. People who move to a whole food, plant-based diet, have families that are healthier and suffer from colds less frequently. They should get a break on health insurance like safe drivers do from auto insurers, since they rarely use it....

48

188

Yes, I certainly agree with this. Mammograms can cause harm - emotional, physical, and financial harm. Women may have a mammogram that comes back with "suspicious calcifications" in one spot. They go back in for more views, and an ultrasound. They have needle biopsies. Still nothing conclusive. Some

60

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doctors may even suggest that they have the area surgically removed. Some of these women take the "watch and wait" option instead and nothing changes over a number of years - in fact, for some, the "suspicious calcifications" area seems to disappear. They are told that they should feel lucky and grateful that they didn't have breast cancer after all that. Strangely, many don't feel lucky; they feel suspicious about the whole medical-industrial system. For every real microscopic cancer found, how other many hundreds of women will undergo numerous costly tests and be given unneeded surgery because of some tiny undefined spot? How about all the emotional and psychological pain of being put on that medical testing treadmill? It's like they give you one test, which leads another test, which leads to more tests, or to a drug, which leads to another drug. It's no wonder our medical system is so costly. Some women in their mid-40s may have only had a couple of mammograms since turning 40. After reading a lot of the research, they have decided to have a mammogram only every other year. For some, the mammogram experience is a nightmare. I have heard of some women who have experienced mammogram technicians who were cold, unfriendly, and seemed hurried. Then they get a call from an icy technician to say that the result was "suspicious" and they need to come in as soon as possible for a follow up. They may not even be given any other information, like which breast was abnormal. These women then spend the time until their follow-up in a complete panic, crying and thinking that they are going to die. Even though they can find some reassuring information on the internet, they will also find a lot that will terrify them. So, then they go in and have a diagnostic mammogram. If they are lucky, they might get a different technician who is kinder, more patient, and thorough. Even still, waiting there for the radiologist to review their scans seems like the longest 15 minutes of their lives. The outcome? Negative. These women are then told that probably some tissue had overlapped in their breast during the first scan, because the breast was not sufficiently compressed. No wonder many of these women decide not to have another mammogram until they're 50.

65.1 240

There are women who are victims of an over zealous system designed to over diagnose breast cancer and profit from the measures necessary to treat it. These women have their first mammograms in their 40s and are subsequently called back to have a 2nd screening done based on something that looks abnormal. After the 2nd level of screening, they are told they

61.4 258

need a biopsy. First they have a radiologist insert a needle gun into their breast and inject a small pea size metal pellet at the exact site of the abnormal looking breast tissue. This is done as a marker for the biopsy and to pull out a very small amount of tissue to send to the lab. Long story short, the very small biopsy may be inconclusive, but the experience can be dreadful. Sometimes, women can lose a lot of blood there on the table and have complications that leave the whole side of their chest bruised. Then, they schedule "biopsies," which one might think would be a simple procedure in-office. However, what they call a "biopsy" is actually referred to by surgeons as a lumpectomy. This is required to be done in a hospital under general anesthesia. When all is said and done, the diagnosis may not even be cancer, but rather something like a fibro-adenoma. In other words, nothing to be concerned with. As a result, some of these women now have permanent scars on their breasts and may no longer have symmetry, which can be very disturbing and erode their confidence.

I have been baffled at the volume of physicians who came out with knee-jerk reactions to this study--a surprising anti-intellectual response. I think there are two things operating there: 1) many physicians took the minimum statistics required, and forgot most of it, and do not have a very good understanding of probability and statistics, and 2) there's a well-known psychological bias that causes people to overestimate the likelihood of an event if they have had a personal experience of that event. Hence, the "it happened to one of my patients so it must be something everyone should be concerned about" attitude. General public has this problem too. The "my mother/sister/aunt/friend/teacher had this happen, so I need to be concerned about it as well"• . If we're going to use this as a rationale for potentially invasive screening, we should be getting routine lumbar punctures to screen for MS, or having routine EKGs to screen for potential heart problems. I think there's a case to be made for "enough". And yes, I know people who have met an untimely end to breast cancer. They all were either in a population that doesn't get screened at all (20s) or had been having mammograms routinely that nevertheless didn't uncover the cancer until it was too late. Some women have false positives on their first mammo, and their second, and their third. After doing a pile of research, they arrive at the conclusion that fibrocystic breasts are much more likely than any cancerous condition. Some of these women have resisted and will continue to resist a biopsy. They may have even

55.4

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concluded that if the "suspicious" mass in their breast IS cancer, they will not do anything about it-- if it hasn't been changing for years, and it is cancer, it's clearly one of the super slow-moving and possibly never a problem cancers. The personal costs of getting it treated may well outweigh any shreds of concern they have.

Average 57.5 155.1

Table E4

User-Generated Mammogram-Detected Cancer Comments without Exemplars

Comment text	Readability (Flesch Kincaid reading ease)	Length (in words)
And how does our pannel want young women to be screened, to prevent them from falling through the cracks? What about the 35 year old woman whose breast cancer races to stage 3 in 6 months because her hormones are appropriately active?	72.7	42
Early detection not only saves lives, it may lead to discovering earlier cancers and lead to more breast-conserving therapy. clearly as chemo gets better, the benefit of any screening will be lessened. We should continue to improve treatment for more advanced disease. Saving 18000 lives with screening seems like a good thing to me.	65.2	55
Thank you for this information. But how can anyone imagine it would be ethical to dissuade women from looking for (and treating) tumors until there is some way to tell which ones are "harmless." It would be like telling kids it is ok to cross the road with their eyes closed, since they probably won't get hit by a truck anyway.	72.6	62
One thing that is not always taken into account is that advanced breast cancers are being seen more and more in younger women - who are too young to get a mammogram. The mammogram could not decrease the number of advanced cancer diagnosis if those with the cancer are not actually getting mammograms. Older women may be getting diagnosed early because of the mammogram.	55.3	63
But when the opponents of regular screening say that mammograms find many small tumors that would never become life-threatening they admit--if they are honest--that	47.8	67

<p>they cannot say for certain which these cases are. Is it their contention that no lives are ever saved by treating small localized tumors found in regular screening and that none of these tumors if ignored would become life-threatening? I am shocked at how easily human lives are treated as just units of statistics. In my opinion, if (and this is a very big IF: a true scientific, fully independent analysis is necessary) saving even a single LIFE calls for testing 1900 women in 10 years it is worth doing it. Lives are reduced to statistics in authoritarian regimes. In our democratic society every life must be considered sacred.</p>	51.3	70
<p>I've never read a more contradictory or ridiculous premise as that forwarded in this article. The panel recommends a change, yet admits that the death rate from breast cancer is REDUCED when mammography is performed regularly from age 40 onwards. Having witnessed my radiologist spouse diagnose breast cancer in young women time and time again, I can only say--don't let number crunchers make medical decision. Statistics can be terribly deceiving.</p>	46.9	73
<p>Are they out of their minds? Have you gone to the forums at the cancer boards and read the forums. A lot more women under 40 are getting breast cancer on a daily basis. Cutting back on mammograms might work for some people, but do you want to wait 2 years before you next one and then find out you have a stage IV cancer instead of a stage One? Get a grip on reality folks. People are dying from cancer, not from 'overtreatment'</p>	83.9	84
<p>If I were a female, this news would make me want to continue having mammography, but instead of reaching for surgery at the first finding of a lump, I would wait until a later mammography to decide whether the lump required immediate or deferred action. As a male beyond the age of 40, I'm well aware that PSA spikes (which I have experienced), may be short lived, and may be meaningless ... certainly nothing to risk surgery and possible loss of sexual function over.</p>	55.5	84
<p>Maybe it's all about the coming government health care. They keep telling us that THEY are going to make "health care" cheaper. Fewer mammograms will definitely cut costs, but will the true costs be seen in more radical surgery to rectify not catching the cancer earlier with mammograms in the first place. About the only thing that this NEW health care is going to afford for women is an abortion...those we</p>	71.9	91

will be able to have, but no early breast cancer detection. That's government for you.....stupid, stupid. I agree with the Harvard Professor of Medicine who said in this morning's Times, "This is crazy." I know of women who have been helped or who are dying from breast cancer. Without those mammograms what of the ones saved? Why are we doing to the women in health care what sounds so severe. Men determine whether abortions can be obtained with government funds. Now we have a panel that tells them about their breasts. How many women on the panel have suffered or had problems? This is exactly what the tea bagggers and the Republicans and Fundamentalists and the Limbaughs and Becks want to hear.	75.5	107
As a radiologist/mammographer I am astonished by the recommendations. Anxiety generated from a negative biopsy is nowhere near equivalent to missing a cancer. And why shouldn't women perform breast self examination? Granted it is a crude test, but it costs nothing and what is the alternative? Doing nothing? Treating a person is different than treating a population. I have diagnosed too many women in their 40's with aggressive cancer, caught early to agree with the conclusions of this study. This basically says that let's not try and detect breast cancer in women in their 40's, it costs too much, both emotionally and financially. Good luck, we'll help you when you get to 50, maybe!	57.2	120
Women please, please, please do not stop getting your screening mammograms! The death rate from breast cancer had been unchanged for 50 years until mammography screening began in the mid-1980's. Soon after the death rate began to fall. Each year there are now more than 30% fewer deaths each year as a result of early detection. Therapy has improved, but therapy saves lives when breast cancers are found early. The data clearly show that screening women beginning at the age of 40 saves the most lives and the most years of life lost to breast cancer. It is completely cost effective. The arguments against screening such as massive overdiagnosis have been fabricated. Mammography is not perfect, but it is saving thousands of lives each year. We need to move away from poor peer review and back to science based practice. Annual mammography screening is the best advice that we can provide to women.	71.9	155
Being of a suspicious nature, I tend to think this is another trick on women's health care. Another way for the insurance companies to spend less, kill more. But, beyond all this, it is	73.9	162

odd that these (are they doctors?) people in the federal government have decided to confuse and worry the issue of breast cancer. It doesn't take much to see that mammograms do detect breast cancer and do stop women from dying. And- what is really astounding is the discrediting of self-exams. What the!?! If a woman has no insurance, she doesn't get a yearly physical. Therefore she does not get a breast exam by a doctor. If she has not been told to use breast self exams, how will she know if she has cancer until too late. It is another insane political game using women's health rights to smoke screen the real danger which is NO HEALTH CARE REFORMATION, NO UNIVERSAL SINGLE PLAYER. The recommendations, issued Monday by a federal advisory panel, reversed widely promoted guidelines and were intended to reduce overtreatment. Issued by a federal advisory panel...hmmmm. My prediction is that this will be the first of many "federal advisory" panels to come. Let's see next it will be heart screenings, prostate sreenings, blood tests, etc. I mean really it's only 1 life in 2000.... come on now folks it really isn't that big of a deal. This is the beginning of rationing. If you think medicine is all about money now wait until the government takes over. Sorry but I still trust my doctor more then any politician or "federal advisory" board to tell me what I should and shouldn't do. Unfortunately I've known too many people who have gotten cancer but luckily enough were saved by early discovery. Until something better comes along the recommendations should remain the same. If this is change we can believe in you can keep it.

	63.1	167
Average	64.3	93.5

Table E5

User-Generated Mammogram-Detected Cancer Comments with Exemplars

Comment text	Readability (Flesch Kincaid reading ease)	Length (in words)
No family history, never smoked and not overweight, I had a small, but invasive breast cancer found by an alert doctor	72.7	40

screening a mammogram. so here I am, almost 17 years later...do as you wish and best of luck.		
The recommendations of not getting mammograms and not doing breast self exams is completely about the insurance companies saving money. They will save millions. And then there is us. Well, for one, I would be dead. DEAD. I am a survivor and it is because of breast self exams and mammograms.	72.1	51
At age 39, a tumor too small to be felt was found by mamography, removed, and today I am alive and cancer free. Statistically speaking, yes, it may be seem that doing screening tests on younger women isn't worth the effort and price tag UNLESS IT IS YOUR LIFE THAT IS SAVED!!! Patients are not statistics, they are individuals.	70.4	60
A mammogram at the age of 41 found suspicious sites that later turned out to be LCIS, DCIS and an invasive carcinoma (stage zero). After much agonizing (and a lumpectomy), I decided to have a mastectomy. There has been no recurrence since (I am now 50). So far as I am concerned, the mammogram detected cancer early enough to save my life.	61.5	62
I can only tell this: I am one of the millions of women all over the world that are still alive thanks to a mammography at 40. I had breast cancer two years ago with 41. I imagine my no future if the doctors and the authorities heard to this panel. Please, be careful with such recommendations. We are talking about life and death.	76.2	64
I had a "routine" mammogram and they discovered a golf ball sized aggressive cancer. Without the mammogram I would not have known. I have finished my treatments and I would encourage women over 40 be screened because I felt great and had no idea I had cancer. No a mammogram is not a cure but it does help us find out something is wrong. How dare you say otherwise	80	69
This has nothing to do with the statistics, but mammography detected a very small lump for me (undetectable from the outside), and, after a lumpectomy, spurred a genetic test that revealed that I was BRCA positive. Now, after a double mastectomy and a hysterectomy, my risks for breast and ovarian cancers are lower than average. My mother and my aunt died of ovarian and breast cancer. That mammogram definitely saved my life.	48.7	72
My daughter was diagnosed with breast cancer detected by a mammogram when she was 43. It was not palpable and fortunately had not spread to the lymph nodes. She had a	60.7	79

<p>lumpectomy and radiation, but did not require chemo. She is now a 15 year survivor and I am grateful that it was caught early. Mammograms use much less radiation than they did years ago. I am an advocate of early detection with mammography in conjunction with self examination.</p> <p>I had dinner tonight with a friend who like me was shocked and angered by this news alert. I had my first mammogram at age 44 and cancer was discovered. Had I waited until 50 I never would have seen my 50th birthday. My friend lost a sister at age 40 to breast cancer ! I hope and expect this news will spark a huge outrage as it should. I am furious and I suspect this is a financial decision rather than a medical one.</p>	82.8	84
<p>this is just the beginning of medicine by statistics. aka obama-pelosi care. i know three woman today in their 40's battling breast cancer of an aggressive type. if not for the mammograms these would be unnoticed and untreated for a few more years..no wait you can you treat cancer after the patient is dead right?'it wont' belong before the statisticians information will filter to the provider and we will see a resurgence of breast cancer deaths. if i am not mistaken england has a miserable survival rate!!</p>	63.5	91
<p>Good for all of you for whom this is an intellectual exercise. You're lucky. I can only tell what happened to me. This year at 48, with no family history and no symptoms, I was diagnosed with a stage 1 invasive ductal carcinoma after my routine annual (digital) mammogram. I had a lumpectomy and radiation. If I waited until I felt a lump, or if my first screening had come at 50, I doubt my cancer would have been stage one. You can manipulate statistics in many ways...but I assure you...if it's your breast and your cancer, you have a different viewpoint. I'll take the mammograms, thank you.</p>	71.1	113
<p>Bad, bad idea. I was diagnosed at age 46 with a tiny but extremely aggressive cancer via mammogram; it could not be felt in an examination. My last mammogram (totally 'clean') had been eighteen months before; now the cancer had already spread to the lymph nodes. After surgery, chemo, and radiation, my predicted 10-year survival chances are 92%. If I had waited until age 50...by that time the cancer would probably had already metastasized and I would be facing a death sentence. Women, don't die needlessly. Have your first mammogram at age 40 or below (some doctors recommend starting at age 35) and keep having them every year. It could save your life. I know it saved mine.</p>	67.3	121

<p>As an eight year survivor I am really glad I had yearly mammograms. My tumor was low-grade, well differentiated, and small. But my breasts were also small. Why would I want to wait until I or another could palpate the cancer and surgery would require more removal of breast tissue and more disfigurement.? That counts for something. Waiting could also result in a greater chance of lymphodema if lymph node dissection is required.. I have mild lymphodema and even that is a pain. Most breast cancers, I believe 70-80%, break out of the milk ducts which makes them life threatening at some point. Why wait? It's not like the majority of prostate cancers which I understand grow so slowly that most men will die of something else. As a survivor you WANT to survive and early detection and treatment is physically and mentally justifiable.</p>	66.7	147
<p>these recommendations are primitive, phallo-centric, absurd, cruel, stastically immoral and the work of fools. i turned 50 this year. in 2006, if not for mammography and highly-trained, vigilant radiologists, i would be extremely ill now, my life most likely unrecoverable. after a hx of normal screenings, i missed ONE mammography in '05 because i was caregiving a dying parent. the tumor was not palpabable by the way and it was already a stage 1. breast cancers do not discriminate on the basis of race, ethnicity, class, whether pre-menopausal or post-menopausal, motherhood or lifestyle. there are many women who are in high-risk categories and many women who develop breast cancers who have no known risk at all. if this is part of the assignment of "health care reform", then American women face very serious trouble in achieving an enduring worthiness and equality in this society.</p>	46	149
<p>My mother received regular mammograms starting at 50. She was diagnosed with stage 4 breast cancer at 54. At that time, she'd gone about eight months between mammograms. While she had been a smoker and had some other risk factors for various types of cancer, she was not in a high risk group for breast cancer. She died this August of breast cancer, which had come back in her bones after six cancer-free years. I am not an oncologist and do not know how her cancer would have progressed untreated if, as recommended now, she had received a mammogram every two years. But her cancer was aggressive, and it seems likely to me that, had she received mammograms less frequently, her doctor would not have caught it until it was even further advanced. I think my</p>	66.5	183

mother would have been deprived of ten years of life, during which she traveled, became a grandmother (twice over), and saw her middle child married. Having lost my mother before she was even eligible for Social Security, I do not intend to follow this guideline.

Average 67.1 92.3

Table E6

Mammogram-Detected Cancer Comments (from Table E5) Rewritten to Remove

Exemplars but Preserve Content

Comment text	Readability (Flesch Kincaid reading ease)	Length (in words)
Women with no family history, who have never smoked and are not overweight can have small, invasive breast cancer found by alert doctors and screening mammograms. These women can then go on to live for many years...do as you wish and best of luck.	73.2	45
The recommendations of not getting mammograms and not doing breast self exams is completely about the insurance companies saving money. They will save millions. And then there is us women. Many women would be dead. DEAD. There are survivors and it is because of breast self exams and mammograms.	65.6	49
Some women in their late 30s can have tumors too small to be felt found by mamography, have them removed, and continue to live cancer free. Statistically speaking, yes, it may be seem that doing screening tests on younger women isn't worth the effort and price tag UNLESS IT IS YOUR LIFE THAT IS SAVED!!! Patients are not statistics, they are individuals.	70	63
Women in their early 40s can have mammograms that find suspicious sites that later turn out to be LCIS, DCIS or invasive carcinomas. I could imagine that after much agonizing (and maybe a lumpectomy), some of these women then decide to have a mastectomy. If there is no recurrence, so far as I am concerned, the mammogram detected cancer early enough to save their lives.	53.4	65

I can only tell this: millions of women all over the world are still alive thanks to a mammography at 40. Women have breast cancer in their early 40s. I imagine their no future if the doctors and the authorities heard to this panel. Please, be careful with such recommendations. We are talking about life and death.	72.1	57
Women can have "routine" mammograms where they discover a golf ball sized aggressive cancer. Without the mammogram they would not have known. I would encourage women over 40 be screened because people can feel great and have no idea they have cancer. No a mammogram is not a cure but it does help find out something is wrong. How dare you say otherwise	78.6	63
This has nothing to do with the statistics, but mammography can detect very small lumps (undetectable from the outside). After having a mammogram that detects a lump and possibly a lumpectomy, some women go on to have genetic tests that reveal they are BRCA positive. If these women have a double mastectomy and a hysterectomy, their risks for breast and ovarian cancers are lower than average. Those mammograms definitely saved their lives.	46.4	72
Some women are diagnosed with breast cancer detected by a mammogram in their early 40s. Some of these lumps may not be palpable, and, if women are fortunate, may be caught before cancer spreads to the lymph nodes. Such tumors may require lumpectomy and radiation and possibly chemo. These women are survivors and I am grateful that their cancer can be caught early. Mammograms use much less radiation than they did years ago. I am an advocate of early detection with mammography in conjunction with self examination.	56	87
I had dinner tonight with a friend who like me was shocked and angered by this news alert. Women can have cancer discovered by mammogram in their mid-40s. Had they waited until 50 they never would have seen their 50th birthdays. Some women even die of breast cancer in their early 40s! I hope and expect this news will spark a huge outrage as it should. I am furious and I suspect this is a financial decision rather than a medical one.	78.6	83
this is just the beginning of medicine by statistics. aka obama-pelosi care. There are woman today in their 40's battling breast cancer of an aggressive type. if not for the mammograms these would be unnoticed and untreated for a few more years..no wait you can you treat cancer after the	63.1	90

patient is dead right?it wont' belong before the statisticians information will filter to the provider and we will see a resurgence of breast cancer deaths. if i am not mistaken england has a miserable survival rate!!

Good for all of you for whom this is an intellectual exercise. You're lucky. I can only tell you what happens to women who are diagnosed with cancer. Every year, women in their late 40s, with no family history and no symptoms, are being diagnosed with early stage breast cancer after having routine annual mammograms. They may have to have a lumpectomy and radiation. If these women waited until they felt a lump, or if their first screening had come at 50, I doubt their cancer would be found at an early stage. You can manipulate statistics in many ways...but these women probably have a different viewpoint and will take the mammograms.

64.7 114

Bad, bad idea. Women in their 40s can be diagnosed with extremely aggressive cancer via mammogram; these tumors may not be able to be felt in an examination. Some of these women may have even had clean mammograms in the last two years, only to then find cancer that has already spread to the lymph nodes. After surgery, chemo, and radiation, these women have a predicted 10-year survival chances above 90%. If they had waited until age 50...by that time the cancer would probably had already metastasized and they would be facing a death sentence. Women, don't die needlessly. Have your first mammogram at age 40 or below (some doctors recommend starting at age 35) and keep having them every year. It could save your life. It has saved others.

67.4 133

Breast cancer survivors are probably glad they had yearly mammograms. Some of these women may have had tumors that were low-grade, well differentiated, and small. But why would they want to wait until they or another could palpate the cancer and surgery would require more removal of breast tissue and more disfigurement.? That counts for something. Waiting could also result in a greater chance of lymphodema if lymph node dissection is required.. Even mild lymphodema is a pain. Most breast cancers, I believe 70-80%, break out of the milk ducts which makes them life threatening at some point. Why wait? It's not like the majority of prostate cancers which I understand grow so slowly that most men will die of something else. Survivors WANT to survive and early detection and treatment is physically and mentally justifiable.

61.9 139

these recommendations are primitive, phallo-centric, absurd, cruel, stastically immoral and the work of fools. some women turning 50 this year have already had an experience with breast cancer. if not for mammography and highly-trained, vigilant radiologists, they would be extremely ill now, their lives most likely unrecoverable. after a hx of normal screenings, and missing even one mammography, some of these women were diagnosed with tumors that may not have even been palpable. breast cancers do not discriminate on the basis of race, ethnicity, class, whether pre-menopausal or post-menopausal, motherhood or lifestyle. there are many women who are in high-risk categories and many women who develop breast cancers who have no known risk at all. if this is part of the assignment of "health care reform", then American women face very serious trouble in achieving an enduring worthiness and equality in this society.

40.8 148

Even women who receive regular mammograms starting at 50 may be diagnosed with late-stage breast cancer in their 50s. Sometimes these cancers are found in between annual mammograms. While some of these women may be smokers and have other risk factors for various types of cancer, they may not be in a high risk group for breast cancer. A number of these women may go on to die of breast cancer which can come back in another part of their body after the woman has been cancer-free for a number of years. I am not an oncologist and do not know how these cancers would have progressed untreated if, as recommended now, these women had received a mammogram every two years. But when their cancer is aggressive, it seems likely to me that, had they received mammograms less frequently, their doctors would not have caught it until it was even further advanced. I think these women would have been deprived of additional years of life, during which they could have been traveling, becoming grandmothers, and seeing their children get married. I do not intend to follow this guideline.

61.2 190

Average 63.5 93.2

Table E7

Neutral or Balanced Nonexemplar Comments

Comment text	Readability	
	(Flesch Kincaid reading ease)	Length (in words)
I'll bet you ten to one that physicians who own mammography units will be slower to adopt the new guidelines than those refer out mammograms.	50.3	26
Women are being advised to discuss the pros and cons of having a mammogram before getting one automatically at age 40. What is so controversial about having a woman be informed of her choices before making a medical decision?	41.7	39
A problem with the mammography screening studies is their end-points: number of false positives vs number of deaths averted. Very few studies look at another endpoint - morbidity from chemotherapy. How many cancers could be treated by just surgery or surgery and radiation vs chemotherapy?	33.7	45
Hopefully, what will eventually evolve from the current debate is a serious discussion between every woman and her physician regarding the risks and benefits of yearly screening. Of course, we will have to wait until all of the irrational screaming stops to get to that point.	41.9	46
It is far too naive to make a blanket statement that private insurance companies will continue to support mammography for women under 50 at low risk for breast cancer. They may do it now as a public relations type move but these companies, for the most part, bend over backwards to maximize profits. No one knows what will happen in the future as far as their policies.	61.7	67
I wish instead of telling women not to get screened that science would direct more effort to distinguishing which non-invasive cancers are dangerous and which aren't. Dying of breast cancer isn't pleasant, for that matter neither is systemic therapy. A woman with a history of breast cancer -personal or familial- is not overzealous in wanting to avoid dying or even being treated in a major way for the disease. Right now the tools for distinguishing life threatening cancers from those that aren't are non-existent. Progress would be appreciated.	51.5	93
It has been the norm in Canada for many years for women to begin having mammograms at the age of 50. The extra anxiety that women in the US have been experiencing with early breast screening, for the most part, has not been a part of Canadian women's lives. Obviously, in some individual	47.4	95

cases, early screening has been life-saving and in Canada women with cause for concern do receive the necessary mammograms and further testing. It would be interesting to know more about the health policies and statistics regarding mammograms in other countries.

This appears to be a recession/depression problem, that is, a recession happens to a population whereas a depression happens to a person. The decision is set based on the cost/benefits of screening a population but the consequences are terrible if that one person in 1-10,000 who is not saved is you. After people get used to the new standards or a new generation of women who get used to screening at 50 replace the current group, I would predict that there will be no difference in people's reactions to the new threshold as compared to the old.

49.6 102

What I find interesting is how free some of the MD's feel to use their own subjective judgment on treatment recommendations. MD's are not machines, nor should they be, but it seems that the medical profession could do a better job of training MD's to use science and consensus-based recommendations. Not just with this screening example, but how large of a role do emotions and subjective judgement play in choosing one prescription drug over another (think pharmaceutical rep influence) or in choosing when a cesarean delivery is necessary? My hunch is the medical profession could use a change in culture.

48.7 104

Women encounter two fears that shake them with regard to the new recommendations. There is, most obviously, dread of Cancer; the fact that many cancers may be slow-growing and non-life-threatening does little to ameliorate that dread. The second fear is that of relegation to second-class citizen. The inroads made by womens' liberation are not so substantial that there is no slippery slope. There lurks a sad suspicion that women are still expendable, that the medical community pays less attention to women than to men and sees less need to be truly careful of them. Only when both of these perceptions die out will recommendations of the sort now put forth be regarded with more rationality than emotion.

54.2 121

What one needs to understand with these new guidelines is that it acknowledges not that screening is useless, but that the tools with which we do screen are not adequate at this point. Currently there are no good predictive biomarkers that would stratify women into groups that would and would not benefit from early mammograms. A large percentage of women

42.3 126

diagnosed in the 40s with breast cancer had no "risk factors" - again meaning that we probably don't understand risk factors enough. Clinical discoveries, in particular in the area of diagnosis, are developing rapidly today, as we do understand genetic and genomic risk factors more readily. The hope could be that in the near future better technology will make screening more accurate, and stratification more possible. A very difficult situation. We grew up, as physicians, to recommend mammograms almost as dogma, at least from the standpoint of legal exposure, heavens forbid this study was skipped and cancer developed later on (in a given patient). The fact is that a mammogram may indeed help diagnose cancer a bit earlier, perhaps allowing earlier treatment. The question remains as to its benefit to make a difference in prognosis, to catch the disease before it spreads, when it is performed on all women, independent of known factors that increase the incidence (i.e. family history). The recommendation for the routine mammogram on a yearly basis may not change as long as it is recommended by professional specialties, is covered by Insurance and the feared Liability hangs in the equation.

44.5 129

I am always surprised that breast cancer awareness campaigns, and articles always look at screenings, detection, research into technologies and medications to "eradicate" the cancer...but they rarely take a strong look at the pollutants in our world today that are finding their way into women's breast tissue. In my opinion, campaigns for clean water, clean air, organic food, natural beauty care products...all of these campaigns should join forces with breast cancer prevention and awareness - or actually in fact, the other way around - since women's awareness in this country of the issue of breast cancer is so strong and the pink-ribbon is so well known, what better way to grab national attention about the bigger picture of the toxic environment that we live in and raise our children in than to have the breast cancer organizations start to raise our awareness of prevention through creating a healthier environment.

32.5 152

Screening and treatment are important pieces of the conversation about breast cancer in the US, but what's missing from so many discussions is prevention. (And I don't mean early detection, which is what screening can provide, albeit with the crucial caveats). What we spend on prevention, both in terms of research and actual programs, pales in comparison to investments in detection and

41.9 176

treatment. And yet, robust prevention efforts could potentially save more lives than anything else, and at a fraction of the cost to the health care system and society at-large. What we do know about breast cancer prevention, especially the importance of diet and exercise, is not given the attention or budget necessary for implementation. Nor are the lifestyle recommendations we lackadaisically prescribe currently feasible for many of the women who are most at risk of death from breast cancer. Scaling up our meager investments in healthy, unprocessed food for everyone, especially the poor, as well as the creation of environments suitable for exercise in all communities would be a good start.

Screening mammograms help some women, but not as many as if often believed. New recommendations suggest women stop annual screening and 40 and wait until 50 to start every other year screening until 74. Based on numerous studies, this small shift will dramatically reduce false positive but will not increase breast cancer mortality. Right now, 60% of breast cancers are found through screening, which means that 40% of cancers are found another way. Women find lumps in a number of ways. Breast self exam is not recommended because larges studies show it's not effective. However, women do inadvertently feel lumps while bathing (or a woman's partner might feel a lump while touching her.) Some women notice physical changes in the mirror. A woman might feel discomfort as she fastens her bra or she might feel pain in her breast that leads her to touch it or see a doctor. Finally, a lump might be detected during a physical exam by a doctor. The fact that screening is recommended only every other year after 50 and breast self exams are not recommended, does not mean women should do nothing if they suspect something is wrong.

	62.7	196
Average	47.0	101.1

APPENDIX F

DETAILED RESULTS OF MEDIATION ANALYSES

The following tables summarize the details of mediational analyses conducted in Chapters 5 and 6.

Table F1

Transportation as a Mediator of the Effects of Exemplars on Intentions to Have Mammogram in Next Two Years

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (transportation), Coeff. (SE)	Effect of M (transportation) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
FPE _{Ex} vs. FPN _{oEx} → transportation	4.313 (0.111)***	-0.000 (0.165)	—	—	0.000	0.000 (1, 289), p = .998	

Transportation → intention; FPEX vs. FPNoEx →intention	5.086 (0.368)***	—	0.087 (0.078)	-0.255 (0.219)	0.009	1.291 (2, 288), <i>p</i> = .277	0.000 (-0.044, 0.044)
FPEX vs. FPEXRem → transportation	4.294 (0.136)***	0.019 (0.191)	—	—	0.000	0.010 (1, 256), <i>p</i> = .921	
Transportation → intention; FPEX vs. FPEXRem →intention	5.196 (0.378)***	—	-0.012 (0.079)	0.062 (0.240)	0.000	0.046 (2, 255), <i>p</i> = .955	0.000 (-0.039, 0.032)
BCEX vs. BCNoEx → transportation	4.390 (0.131)***	0.145 (0.176)	—	—	0.003	0.681 (1, 253), <i>p</i> = .410	
Transportation → intention; BCEX vs. BCNoEx → intention	4.845 (0.409)***	—	0.187 (0.084)*	0.001 (0.236)	0.019	2.483 (2, 252), <i>p</i> = .086	0.027 (-0.028, 0.133)
BCEX vs. BCEXRem → transportation	4.292 (0.123)***	0.244 (0.171)	—	—	0.007	2.017 (1, 270), <i>p</i> = .157	

Transportation → intention; BCEx vs. BCExRem → intention	4.488 (0.374)***	—	0.217 (0.079)**	0.222 (0.223)	0.033	4.561 (2, 269), $p =$.011	0.053 (-0.010, 0.172)
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Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEX = false-positive comments with exemplars, BCEX = mammogram-detected cancer comments with exemplars, FPEXRem = false positive comments with exemplars removed, and BCEXRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F2

Transportation as a Mediator of the Effects of Exemplars on Intentions to Wait until Age 50 to Have Mammogram

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (transportation), Coeff. (SE)	Effect of M (transportation) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R^2	$F (df), p$	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
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FPEX vs. FPNoEx → transportation	4.313 (0.112)***	0.000 (0.165)	—	—	0.000	0.000 (1, 289), $p =$.998	
Transportation → intention; FPEX vs. FPNoEx → intention	1.971 (0.335)***	—	0.088 (0.071)	0.193 (0.200)	0.009	1.24 (2, 288), $p =$.291	0.000 (-0.043, 0.041)
FPEX vs. FPEXRem → transportation	4.294 (0.136)***	0.019 (0.191)	—	—	0.000	0.010 (1, 256), $p =$ 0.921	
Transportation → intention; FPEX vs. FPEXRem → intention	2.501 (0.334)***	—	-0.008 (0.069)	0.077 (0.212)	0.001	0.073 (2, 255), $p =$.930	0.000 (-0.033, 0.027)
BCEX vs. BCNoEx → transportation	4.390 (0.131)***	0.145 (0.176)	—	—	0.003	0.681 (1, 253), $p =$.410	
Transportation → intention; BCEX vs. BCNoEx → intention	3.067 (0.337)***	—	-0.211 (0.069)**	-0.025 (0.194)	0.036	4.670 (2, 252), $p =$ 0.010	-0.031 (-0.138, 0.033)

BCEX vs. BCEXRem → transportation	4.292 (0.123)***	0.244 (0.171)	—	—	0.007	2.017 (1, 270), $p =$.157	
Transportation → intention; BCEX vs. BCEXRem → intention	3.101 (0.318)***	—	-0.205 (0.067)**	-0.086 (0.189)	0.036	4.949 (2, 269), $p =$.008	-0.050 (-0.154, 0.011)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEX = false-positive comments with exemplars, BCEX = mammogram-detected cancer comments with exemplars, FPEXRem = false positive comments with exemplars removed, and BCEXRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F3

Attitude toward Mammography as a Mediator of the Effects of Exemplars on Intentions to Have Mammogram in Next Two Years

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (attitude), Coeff. (SE)	Effect of M (attitude) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R^2	$F (df), p$	Indirect effect of X on Y through M, Coeff. (bootstrapped)
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							bias-corrected 95% CI)
FPE _{Ex} vs. FPN _{oEx} → attitude	5.409 (0.127) ^{***}	-0.081 (0.189)	—	—	0.001	0.182 (1, 290), <i>p</i> = 0.670	
Attitude → intention; FPE _{Ex} vs. FPN _{oEx} → intention	2.493 (0.350) ^{***}	—	0.551 (0.060) ^{***}	-0.224 (0.193)	0.230	43.050 (2, 289), <i>p</i> < .001	-0.044 (-0.245, 0.168)
FPE _{Ex} vs. FPE _{ExRem} → attitude	4.875 (0.150) ^{***}	0.453 (0.211)*	—	—	0.018	4.639 (1, 259), <i>p</i> = 0.032	
Attitude → intention; FPE _{Ex} vs. FPE _{ExRem} → intention	2.414 (0.331) ^{***}	—	0.561 (0.610) ^{***}	-0.200 (0.208)	0.249	42.695 (2, 258), <i>p</i> < .001	0.254 (0.026, 0.521)
BCE _{Ex} vs. BCN _{oEx} → attitude	5.464 (0.156) ^{***}	0.075 (0.208)	—	—	0.001	0.129 (1, 251), <i>p</i> = .720	
Attitude → intention; BCE _{Ex} vs. BCN _{oEx} → intention	3.34 (0.399) ^{***}	—	0.427 (0.067) ^{***}	-0.021 (0.220)	0.141	20.591 (2, 250), <i>p</i> < .001	0.032 (-0.147, 0.215)
BCE _{Ex} vs. BCE _{ExRem} → attitude	5.280 (0.138) ^{***}	0.259 (0.192)	—	—	0.007	1.82 (1, 270), <i>p</i> = .178	

Attitude → intention; BCEX vs. BCEXRem → intention	2.976 (0.376)***	—	0.463 (0.066)***	0.141 (0.207)	0.161	25.779 (2, 269), $p < .001$	0.120 (-0.049, 0.310)
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Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEX = false-positive comments with exemplars, BCEX = mammogram-detected cancer comments with exemplars, FPEXRem = false positive comments with exemplars removed, and BCEXRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F4

Attitude toward Delaying Mammography as a Mediator of the Effects of Exemplars on Intentions to Wait until Age 50 to Have Mammogram

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (attitude), Coeff. (SE)	Effect of M (attitude) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R^2	$F (df), p$	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
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FPEX vs. FPNoEX → attitude	3.459 (0.135)***	0.001 (0.201)**	—	—	0.000	0.000 (1, 289), $p = .998$	
Attitude → intention; FPEX vs. FPNoEX → intention	0.820 (0.220)***	—	0.448 (0.053)***	0.159 (0.180)	0.202	36.377 (2, 288), $p < .001$	0.000 (-0.191, 0.177)
FPEX vs. FPEXRem → attitude	3.354 (0.147)***	0.105 (0.206)	—	—	0.001	2.759 (1, 258), $p = .609$	
Attitude → intention; FPEX vs. FPEXRem → intention	0.800 (0.229)***	—	0.502 (0.056)***	-0.007 (0.185)	0.240	40.567 (2, 257), $p < .001$	0.053 (-0.154, 0.255e)
BCEX vs. BCNoEX → attitude	3.254 (0.168)***	-0.232 (0.226)	—	—	0.004	1.062 (1, 252), $p = .304$	
Attitude → intention; BCEX vs. BCNoEX → intention	1.311 (0.222)***	—	0.255 (0.053)***	0.017 (0.189)	0.086	11.733 (2, 251), $p < .001$	-0.059 (-0.196, 0.048)
BCEX vs. BCEXRem → attitude	3.333 (0.152)***	-0.312 (0.211)	—	—	0.008	2.195 (1, 270), $p = .140$	
Attitude → intention; BCEX vs. BCEXRem → intention	0.980 (0.211)***	—	0.368 (0.051)***	0.008 (0.176)	0.165	26.553 (2, 269), $p < .001$	-0.115 (-0.300, 0.030)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEX = false-positive comments with exemplars, BCEX = mammogram-detected cancer comments with exemplars, FPEXRem = false positive comments with exemplars removed, and BCEXRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F5

Norms Related to Having Mammogram in Next Two Years as a Mediator of the Effects of Exemplars on Intention to Have Mammogram

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (norm), Coeff. (SE)	Effect of M (injunctive norm) on Y (intention), Coeff. (SE)	Effect of M (descriptive norm) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R^2	$F (df), p$	Indirect effect of X on Y through M, Coeff. (bootstrapped bias- corrected 95% CI)
FPEX vs. FPNoEx → injunctive norm	4.838 (0.137)***	0.035 (0.204)	—	—	—	0.000	0.029 (1, 291), $p = .865$	0.0138 (- 0.154, 0.170)

FPE _{Ex} vs. FPN _{oEx} → descriptive norm	4.888 (0.129)***	-0.226 (0.191)	—	—	—	0.005	1.401 (1, 291), <i>p</i> = .238	-0.029 (-0.141, 0.010)
Injunctive norm, descriptive norm → intention; FPE _{Ex} vs. FPN _{oEx} →intention	2.909 (0.357)***	—	0.398 (0.064)***	0.1295 (0.069)	-0.2503 (0.197)	0.196	23.506 (3, 289), <i>p</i> < .001	
FPE _{Ex} vs. FPE _{ExRem} → injunctive norm	4.516 (0.149)***	0.357 (0.209)	—	—	—	0.011	2.907 (1, 259), <i>p</i> = 0.089	0.167 (-0.019, 0.387)
FPE _{Ex} vs. FPE _{ExRem} →descriptive norm	4.945 (0.136)***	-0.284 (0.190)	—	—	—	0.009	2.220 (1, 259), <i>p</i> = .138	-0.050 (-0.183, 0.007)
Injunctive norm, descriptive norm → intention; FPE _{Ex} vs. FPE _{ExRem} →intention	2.160 (0.391)***	—	0.467 (0.069)***	0.178 (0.076)*	-0.062 (0.210)	0.244	27.715 (3, 257), <i>p</i> < .001	

BCEx vs. BCNoEx → injunctive norm	4.974 (0.163)***	-0.086 (0.219)	—	—	—	0.001	0.154 (1, 257), <i>p</i> = 0.695	-0.026 (-0.164, 0.106)
BCEx vs. BCNoEx → descriptive norm	4.914 (0.137)***	-0.040 (0.184)	—	—	—	0.000	0.0465 (1, 257), <i>p</i> = 0.829)	-0.005 (-0.093, 0.039)
Injunctive norm, descriptive norm → intention; BCEx vs. BCNoEx → intention	3.524 (0.431)***	—	0.297 (0.077)***	0.123 (0.091)	0.126 (0.224)	0.113	10.875 (3, 255), <i>p</i> < 0.001	
BCEx vs. BCExRem → injunctive norm	4.758 (0.147)***	0.131 (0.204)	—	—	—	0.002	0.410 (1, 273), <i>p</i> = 0.522	0.044 (-0.087, 0.195)
BCEx vs. BCExRem → descriptive norms	4.894 (0.129)***	-0.020 (0.179)	—	—	—	0.000	0.012 (1, 273), <i>p</i> = 0.912	-0.006 (-0.112, 0.098)

Injunctive norm, descriptive norm → intention; BCEx vs. BCExRem → intention	2.453 (0.369)***	—	0.340 (0.073)***	0.278 (0.083)***	0.229 (0.197)	0.234	27.527 (3, 271), <i>p</i> < .001
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Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEX = false-positive comments with exemplars, BCEx = mammogram-detected cancer comments with exemplars, FPEXRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected cancer comments with exemplars removed.

p* < .05, *p* < .01, ****p* < .001

Table F6

Norms Related to Waiting Until Age 50 to Have Mammograms as a Mediator of the Effects of Exemplars on Intention to Have Mammogram

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (norm), Coeff. (SE)	Effect of M (injunctive norm) on Y (intention), Coeff. (SE)	Effect of M (descriptive norm) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	<i>R</i>²	<i>F</i> (<i>df</i>), <i>p</i>	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-
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								corrected 95% CI)
FPE _x vs. FPN _o Ex → injunctive norm	2.706 (0.119)***	0.001 (0.177)	—	—	—	0.000	0.000 (1, 291), <i>p</i> = .998	0.000 (-0.182, 0.188)
FPE _x vs. FPN _o Ex → descriptive norm	3.300 (0.127)***	0.001 (0.189)	—	—	—	0.000	0.000 (1, 291), <i>p</i> = 0.997	0.000 (-0.072, 0.084)
Injunctive norm, descriptive norm → intention; FPE _x vs. FPN _o Ex → intention	0.3122 (0.211)	—	0.526 (0.064)***	0.193 (0.060)**	0.166 (0.163)	0.344	50.420 (3,289), <i>p</i> < .001	
FPE _x vs. FPE _x Rem → injunctive norm	2.930 (0.134)***	-0.223 (0.188)	—	—	—	0.005	1.409 (1, 259), <i>p</i> = 0.236	-0.102 (-0.288, 0.062)
FPE _x vs. FPE _x Rem → descriptive norm	3.227 (0.133)***	0.074 (0.187)	—	—	—	0.001	0.158 (1, 259), <i>p</i> = 0.691	0.021 (-0.082, 0.144)

Injunctive norm, descriptive norm → intention; FPEX vs. FPEXRem → intention	0.209 (0.238)	—	0.459 (0.066)***	0.289 (0.067)***	0.138 (0.173)	0.339	43.911 (3, 257), <i>p</i> < .001	
BCEX vs. BCNoEX → injunctive norm	2.757 (0.145)***	-0.218 (0.195)	—	—	—	0.005	1.246 (1, 256), <i>p</i> = .265	-0.065 (-0.213, 0.039)
BCEX vs. BCNoEX → descriptive norm	3.052 (0.145)***	0.409 (0.194)*	—	—	—	0.017	4.445 (1, 256), <i>p</i> = .036	0.070 (0.008, 0.190)
Injunctive norm, descriptive norm → intention; BCEX vs. BCNoEX → intention	0.786 (0.232)***	—	0.298 (0.067)***	0.171 (0.068)**	-0.052 (0.182)	0.172	17.630 (3, 254), <i>p</i> < .0010	
BCEX vs. BCEXRem → injunctive norm	2.689 (0.126)***	-0.151 (0.174)	—	—	—	0.003	0.749 (1, 273), <i>p</i> = 0.388	-0.049 (-0.178, 0.061)

BCEx vs. BCExRem → descriptive norms	3.265 (0.137)***	0.1-0.096 (0.189)	—	—	—	0.004	1.077 (1, 273), $p =$ 0.300	0.043 (-0.178, 0.061)
Injunctive norm, descriptive norm → intention; BCEx vs. BCExRem → intention	0.627 (0.226)**	—	0.325 (0.072)***	0.218 (0.066)**	-0.122 (0.171)	0.212	24.279 (3, 271), $p <$ 0.001	

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F7

Self-Efficacy as a Mediator of the Effects of Mammogram-Detected Breast Cancer Exemplars on Intentions to Have Mammogram in Next Two Years

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (self- efficacy), Coeff. (SE)	Effect of M (self-efficacy) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias- corrected 95% CI)
BCEx vs. BCNoEx → self-efficacy	8.565 (0.279)***	0.239 (0.375)	—	—	0.002	0.406 (1, 256), p = .525	
Self-efficacy → intention; BCEx vs. BCNoEx → intention	4.758 (0.379)***	—	0.099 (0.039)*	0.067 (0.236)	0.025	3.271 (2, 255), p = 0.040	0.024 (-0.044, 0.124)
BCEx vs. BCExRem → self-efficacy	8.296 (0.249)***	0.509 (0.345)	—	—	0.008	2.169 (1, 273), p = .142	
Self-efficacy → intention; BCEx vs. BCExRem → intention	3.533 (0.339)***	—	0.229 (0.037)***	0.151 (0.210)	0.131	20.405 (2, 272), p < .001	0.116 (-0.032, 0.305)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, BCEx = mammogram-detected cancer comments with exemplars, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F8

Negative Affect as a Mediator of the Effects of Mammogram-Detected Breast Cancer Exemplars on Perceived Five-Year Risk of Breast Cancer (Measured as a Frequency)

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (negative affect), Coeff. (SE)	Effect of M (negative affect) on Y (perceived risk), Coeff. (SE)	Effect of X (condition) on Y (perceived risk), Coeff. (SE)	R^2	$F (df), p$	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
BCEx vs. BCNoEx → negative affect	1.794 (0.071)***	-0.038 (0.0953)	—	—	0.001	0.1586 (1, 256), $p = 0.691$	

Negative affect → perceived risk; BCEx vs. BCNoEx → perceived risk	13.644 (3.602)***	—	9.961 (1.697)***	-5.547 (2.589)*	0.135	19.855 (2, 255), $p < .001$	-0.378 (-2.415, 1.39)
BCEx vs. BCExRem → negative affect	1.819 (0.072)***	-0.063 (0.100)	—	—	0.002	0.401 (1, 271)	
Negative affect → perceived risk; BCEx vs. BCExRem → perceived risk	15.485 (3.163)***	—	6.566 (1.455)***	-1.428 (2.395)	0.072	10.480 (2, 270), $p < .001$	-0.416 (-1.926, 0.831)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, BCEx = mammogram-detected cancer comments with exemplars, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F9

Negative Affect as a Mediator of the Effects of Mammogram-Detected Breast Cancer Exemplars on Perceived Lifetime Risk of Breast Cancer (Measured as a Frequency)

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (negative affect), Coeff. (SE)	Effect of M (negative affect) on Y (perceived risk), Coeff. (SE)	Effect of X (condition) on Y (perceived risk), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
BCEx vs. BCNoEx → negative affect	1.794 (0.071)***	-0.038 (0.095)	—	—	0.001	0.159 (1, 256), p = 0.691	
Negative affect → perceived risk; BCEx vs. BCNoEx → perceived risk	25.147 (3.702)***	—	6.476 (1.744)***	-0.673 (2.661)	0.052	6.958 (2, 255), p = .001	-0.246 (-1.669, 0.907)
BCEx vs. BCExRem → negative affect	1.819 (0.072)***	-0.063 (0.100)	—	—	0.002	0.401 (1, 271), p = .527	
Negative affect → perceived risk; BCEx vs. BCExRem → perceived risk	28.304 (3.470)***	—	4.378 (1.596)**	-0.146 (2.627)	0.027	3.774 (2, 270), p = .024	-0.277 (-1.409, 0.507)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, BCEEx = mammogram-detected cancer comments with exemplars, and BCEExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F10

Negative Affect as a Mediator of the Effects of Mammogram-Detected Breast Cancer Exemplars on Perceived Five-Year Risk of Breast Cancer (Measured as a Percentage)

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (negative affect), Coeff. (SE)	Effect of M (negative affect) on Y (perceived risk), Coeff. (SE)	Effect of X (condition) on Y (perceived risk), Coeff. (SE)	R^2	$F (df), p$	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
BCEEx vs. BCNoEx → negative affect	1.794 (0.071)***	-0.038 (0.095)	—	—	0.001	0.159 (1, 256), $p = .691$	
Negative affect → perceived risk;	2.298 (3.771)	—	12.277 (1.776)***	-0.303 (2.710)	0.158	23.927 (2, 255), $p < .001$	-0.466 (-2.855, 1.836)

BCEx vs. BCNoEx → perceived risk							
BCEx vs. BCExRem → negative affect	1.812 (0.073)***	-0.057 (0.100)	—	—	0.001	0.318 (1, 270), $p = .573$	
Negative affect → perceived risk; BCEx vs. BCExRem → perceived risk	7.826 (3.558)*	—	9.608 (1.64)***	-1.145 (2.699)	0.114	17.356 (2, 269), $p < .001$	-0.543 (-2.535, 1.388)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, BCEx = mammogram-detected cancer comments with exemplars, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F11

Negative Affect as a Mediator of the Effects of Mammogram-Detected Breast Cancer Exemplars on Perceived Lifetime Risk of Breast Cancer (Measured as a Percentage)

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (negative	Effect of M (negative affect) on Y	Effect of X (condition) on Y (perceived	R^2	$F (df), p$	Indirect effect of X on Y through M,
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		affect), Coeff. (SE)	(perceived risk), Coeff. (SE)	risk), Coeff. (SE)			Coeff. (bootstrapped bias- corrected 95% CI)
BCEx vs. BCNoEx → negative affect	1.794 (0.071)***	-0.038 (0.095)	—	—	0.001	0.159 (1, 256), $p = .691$	
Negative affect → perceived risk; BCEx vs. BCNoEx → perceived risk	9.197 (4.000)*	—	11.480 (1.884)***	-0.223 (2.875)	0.127	18.584 (2, 255), $p < .001$	-0.436 (-2.661, 1.704)
BCEx vs. BCExRem → negative affect	1.812 (0.073)***	-0.057 (0.100)	—	—	0.001	0.318 (1, 270), $p =$ 0.573	
Negative affect → perceived risk; BCEx vs. BCExRem → perceived risk	14.821 (3.700)***	—	8.555 (1.705)***	-0.710 (2.806)	0.086	12.674 (2, 269), $p < .001$	-0.480 (-2.262, 1.186)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, BCEx = mammogram-detected cancer comments with exemplars, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F12

Negative Affect as a Mediator of the Effects of Mammogram-Detected Breast Cancer Exemplars on Perceived Risk of Having a Positive Mammogram (Measured as a Frequency)

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (negative affect), Coeff. (SE)	Effect of M (negative affect) on Y (perceived risk), Coeff. (SE)	Effect of X (condition) on Y (perceived risk), Coeff. (SE)	R^2	$F (df), p$	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
BCEx vs. BCNoEx → negative affect	1.794 (0.071)***	-0.037 (0.096)	—	—	0.001	0.149 (1, 255), $p = .700$	
Negative affect → perceived risk; BCEx vs. BCNoEx → perceived risk	8.650 (3.249)**	—	7.970 (1.530)***	-1.971 (2.338)	0.100	14.033 (2, 254), $p < .001$	-0.294 (-2.039, 1.120)

BCEx vs. BCExRem → negative affect	1.819 (0.072)***	-0.062 (0.100)	—	—	0.001	0.385 (1, 270), $p = .536$	
Negative affect → perceived risk; BCEx vs. BCExRem → perceived risk	13.056 (2.938)***	—	5.931 (1.352)***	-2.794 (2.228)	0.073	10.638 (2, 269), $p < .001$	-0.369 (-1.819, 0.736)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, BCEx = mammogram-detected cancer comments with exemplars, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F13

Negative Affect as a Mediator of the Effects of Mammogram-Detected Breast Cancer Exemplars on Perceived Risk of Having a Positive Mammogram (Measured as a Percentage)

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (negative affect), Coeff. (SE)	Effect of M (negative affect) on Y (perceived	Effect of X (condition) on Y (perceived risk), Coeff. (SE)	R^2	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped
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			risk), Coeff. (SE)				bias- corrected 95% CI)
BCEx vs. BCNoEx → negative affect	1.794 (0.071)***	-0.037 (0.096)	—	—	0.001	0.149 (1, 255), $p = .700$	
Negative affect → perceived risk; BCEx vs. BCNoEx → perceived risk	2.931 (3.136)	—	10.261 (1.477)***	-3.313 (2.257)	0.167	25.477 (2, 254), $p < .001$	-0.378 (-2.434, 1.461)
BCEx vs. BCExRem → negative affect	1.819 (0.072)***	-0.062 (0.100)	—	—	0.001	0.385 (1, 270), $p = .536$	
Negative affect → perceived risk; BCEx vs. BCExRem → perceived risk	9.068 (3.130)**	—	7.130 (1.440)***	-3.947 (2.373)	0.094	13.976 (2, 269), $p < .001$	-0.443 (-2.154, 0.891)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, BCEx = mammogram-detected cancer comments with exemplars, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F14

Negative Affect as a Mediator of the Effects of False-Positive Mammogram Exemplars on Perceived Risk of Having a False-Positive Mammogram (Measured as a Frequency)

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (negative affect), Coeff. (SE)	Effect of M (negative affect) on Y (perceived risk), Coeff. (SE)	Effect of X (condition) on Y (perceived risk), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
FPE _x vs. FPN _{oEx} → negative affect	1.733 (0.073)***	0.132 (0.109)	—	—	0.005	1.474 (1, 291), p = .226	
Negative affect → perceived risk; FPE _x vs. FPN _{oEx} → perceived risk	17.923 (2.916)***	—	6.232 (1.365)***	1.555 (2.541)	0.070	10.867 (2, 290), p < .001	0.824 (-0.377, 2.584)
FPE _x vs. FPE _{xRem} → negative affect	1.819 (0.078)***	0.046 (0.109)	—	—	0.001	0.176 (1, 258), p = .675	
Negative affect → perceived risk;	31.485 (3.413)***	—	2.482 (1.545)	-5.016 (2.707)	0.022	2.93 (2, 257), p = .055	0.114 (-0.299, 1.304)

FPEX vs. FPEXRem
 →perceived risk

Note. Experimental conditions are as follows: FPN0Ex = false-positive comments without exemplars, FPEX = false-positive comments with exemplars, and FPEXRem = false positive comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F15

Negative Affect as a Mediator of the Effects of False-Positive Mammogram Exemplars on Perceived Risk of Having a False-Positive Mammogram (Measured as a Percentage)

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (negative affect), Coeff. (SE)	Effect of M (negative affect) on Y (perceived risk), Coeff. (SE)	Effect of X (condition) on Y (perceived risk), Coeff. (SE)	R^2	$F (df), p$	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
FPEX vs. FPN0Ex → negative affect	1.733 (0.073)***	0.132 (0.109)	—	—	0.005	1.474 (1, 291), $p = .226$	

Negative affect → perceived risk; FPEX vs. FPNoEx →perceived risk	13.971 (3.217)***	—	7.845 (1.506)***	0.581 (2.803)	0.087	13.74 (2, 290), $p < .001$	1.037 (-0.500, 3.068)
FPEX vs. FPEXRem → negative affect	1.819 (0.078)***	0.046 (0.109)	—	—	0.001	0.176 (1, 258), $p = .675$	
Negative affect → perceived risk; FPEX vs. FPEXRem →perceived risk	29.916 (3.979)***	—	2.908 (1.802)	-6.157 (3.156)	0.024	3.125 (2, 257), $p = .046$	0.133 (-0.382, 1.449)

Note. Experimental conditions are as follows: FPNoEx = false-positive comments without exemplars, FPEX = false-positive comments with exemplars, and FPEXRem = false positive comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F16

Perceived Five-Year Risk of Breast Cancer (Measured as a Frequency) as a Mediator of the Effects of Exemplars on Intentions to Have Mammogram in Next Two Years

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (perceived risk), Coeff. (SE)	Effect of M (perceived risk) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias- corrected 95% CI)
FPE _{Ex} vs. FPN _{oEx} → perceived risk	25.169 (1.806)***	-0.364 (2.681)	—	—	0.000	0.019 (1, 291), p = .892	
Perceived risk → intention; FPE _{Ex} vs. FPN _{oEx} →intention	5.271 (0.189)***	—	0.008 (0.005)	-0.263 (0.217)	0.014	2.121 (2, 290), p = .122	-0.003 (-0.066, 0.040)
FPE _{Ex} vs. FPE _{ExRem} → perceived risk	24.492 (1.883)***	0.312 (2.638)	—	—	0.000	0.014 (1, 259), p = .906	
Perceived risk → intention; FPE _{Ex} vs. FPE _{ExRem} →intention	5.001 (0.217)***	—	0.006 (0.006)	0.053 (0.237)	0.005	0.609 (2, 258), p = .544	0.002 (- 0.0345, 0.062)
BCE _{Ex} vs. BCN _{oEx} → perceived risk	31.362 (2.039)***	-5.775 (2.744)*	—	—	0.017	4.430 (1, 257), p = .036	

Perceived risk → intention; BCEx vs. BCNoEx → intention	5.300 (0.243)***	—	0.010 (0.005)	0.152 (0.238)	0.013	1.704 (2, 256), $p = .184$	-0.056 (-0.183, 0.004)
BCEx vs. BCExRem → perceived risk	27.568 (1.774)***	-1.981 (2.460)	—	—	0.002	0.648 (1, 273), $p = .421$	
Perceived risk → intention; BCEx vs. BCExRem → intention	5.260 (0.221)***	—	0.006 (0.006)	0.280 (0.223)	0.010	1.365 (2, 272), $p = .257$	-0.012 (-0.091, 0.014)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F17

Perceived Lifetime Risk of Breast Cancer (Measured as a Frequency) as a Mediator of the Effects of Exemplars on Intentions to Have Mammogram in Next Two Years

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (perceived risk), Coeff. (SE)	Effect of M (perceived risk) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
FPE _{Ex} vs. FPN _{oEx} → perceived risk	32.025 (1.727)***	-0.130 (2.564)	—	—	0.000	0.003 (1, 291), <i>p</i> = .960	
Perceived risk → intention; FPE _{Ex} vs. FPN _{oEx} → intention	5.112 (0.215)***	—	0.011 (0.005)*	-0.264 (0.216)	0.022	3.284 (2, 290), <i>p</i> = .039	-0.001 (-0.072, 0.057)
FPE _{Ex} vs. FPE _{ExRem} → perceived risk	30.516 (1.870)***	1.379 (2.619)	—	—	0.001	0.277 (1, 259), <i>p</i> = .600	
Perceived risk → intention; FPE _{Ex} vs. FPE _{ExRem} → intention	4.844 (0.240)**	—	0.010 (0.006)	0.041 (0.236)	0.012	1.618 (2, 258), <i>p</i> = .200	0.014 (-0.029, 0.101)
BCE _{Ex} vs. BCN _{oEx} → perceived risk	36.853 (2.017)***	-1.007 (2.715)	—	—	0.001	0.138 (1, 257), <i>p</i> = .711	

Perceived risk → intention; BCEx vs. BCNoEx → intention	5.198 (0.266)***	—	0.011 (0.005)*	0.107 (0.236)	0.017	2.14 (2, 256), <i>p</i> = .120	-0.011 (-0.101, 0.043)
BCEx vs. BCExRem → perceived risk	36.205 (1.905)***	-0.358 (2.641)	—	—	0.000	0.018 (1, 273), <i>p</i> = .892	
Perceived risk → intention; BCEx vs. BCExRem → intention	5.325 (0.245)**	—	0.003 (0.005)	0.269 (0.223)	0.007	0.885 (2, 272), <i>p</i> = .414	-0.001 (-0.048, 0.024)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected cancer comments with exemplars removed.

p* < .05, *p* < .01, ****p* < .001

Table F18

Perceived Five-Year Risk of Breast Cancer (Measured as a Percentage) as a Mediator of the Effects of Exemplars on Intentions to Have Mammogram in Next Two Years

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (perceived risk), Coeff. (SE)	Effect of M (perceived risk) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
FPE _{Ex} vs. FPN _{oEx} → perceived risk	20.786 (1.844)***	1.958 (2.732)	—	—	0.002	0.514 (1, 290), p = .474	
Perceived risk → intention; FPE _{Ex} vs. FPN _{oEx} → intention	5.272, (0.174)***	—	0.011 (0.005)*	-0.315 (0.215)	0.025	3.685 (2, 289), p = .026	0.021 (-0.030, 0.106)
FPE _{Ex} vs. FPE _{ExRem} → perceived risk	23.750 (2.080)***	-1.006 (2.914)	—	—	0.001	0.119 (1, 259), p = .730	
Perceived risk → intention; FPE _{Ex} vs. FPE _{ExRem} → intention	4.811 (0.205)***	—	0.014 (0.005)**	0.069 (0.234)	0.031	4.092 (2, 258), p = .018	-0.014 (-0.115, 0.059)
BCE _{Ex} vs. BCN _{oEx} → perceived risk	24.259 (2.180)**	-0.706 (2.934)	—	—	0.000	0.058 (1, 257), p = .810	

Perceived risk → intention; BCEx vs. BCNoEx → intention	5.289 (0.212)***	—	0.013 (0.005)**	0.105 (0.235)	0.026	3.457 (2, 256), $p = .033$	-0.009 (-0.102, 0.064)
BCEx vs. BCExRem → perceived risk	25.626 (2.058)***	-2.074 (2.849)	—	—	0.002	0.530 (1, 272), $p = .467$	
Perceived risk → intention; BCEx vs. BCExRem → intention	5.296 (0.202)***	—	0.005 (0.005)	0.282 (0.224)	0.010	1.319 (2, 271), $p = .269$	-0.011 (-0.088, 0.012)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table F19

Perceived Lifetime Risk of Breast Cancer (Measured as a Percentage) as a Mediator of the Effects of Exemplars on Intentions to Have Mammogram in Next Two Years

Model paths	Constant, Coeff. (SE)	Effect of X (condition) on M (perceived risk), Coeff. (SE)	Effect of M (perceived risk) on Y (intention), Coeff. (SE)	Effect of X (condition) on Y (intention), Coeff. (SE)	R²	F (df), p	Indirect effect of X on Y through M, Coeff. (bootstrapped bias-corrected 95% CI)
FPE _{Ex} vs. FPN _{oEx} → perceived risk	26.413 (1.861)***	2.738 (2.762)	—	—	0.003	0.983 (1, 291), p = .322	
Perceived risk → intention; FPE _{Ex} vs. FPN _{oEx} → intention	5.224 (0.190)***	—	0.009 (0.005)*	-0.291 (0.217)	0.019	2.781 (2, 290), p = .064	0.025 (-0.018, 0.112)
FPE _{Ex} vs. FPE _{ExRem} → perceived risk	28.422 (2.100)***	0.729 (2.941)	—	—	0.000	0.061 (1, 259), p = .805	
Perceived risk → intention; FPE _{Ex} vs. FPE _{ExRem} → intention	4.780 (0.219)***	—	0.013 (0.005)**	0.045 (0.234)	0.026	3.453 (2, 258), p = .033	0.009 (-0.069, 0.098)
BCE _{Ex} vs. BCN _{oEx} → perceived risk	29.931 (2.274)***	-0.798 (3.060)	—	—	0.000	0.068 (1, 257), p = .794	

Perceived risk → intention; BCEx vs. BCNoEx → intention	5.115 (0.223)***	—	0.016 (0.005)***	0.109 (0.232)	0.045	6.036 (2, 256), $p = .003$	-0.013 (-0.121, 0.082)
BCEx vs. BCExRem → perceived risk	30.626 (2.104)***	-1.493 (2.913)	—	—	0.001	0.263 (1, 272), $p = .609$	
Perceived risk → intention; BCEx vs. BCExRem → intention	5.100 (0.214)***	—	0.011 (0.005)*	0.288 (0.222)	0.025	3.445 (2, 271), $p = .033$	-0.016 (-0.102, 0.043)

Note. Experimental conditions are as follows: BCNoEx = mammogram-detected cancer comments with no exemplars, FPEx = false-positive comments with exemplars, BCEx = mammogram-detected cancer comments with exemplars, FPExRem = false positive comments with exemplars removed, and BCExRem = mammogram-detected cancer comments with exemplars removed.

* $p < .05$, ** $p < .01$, *** $p < .001$

APPENDIX G

This appendix includes additional moderation results that were not included in the main text.

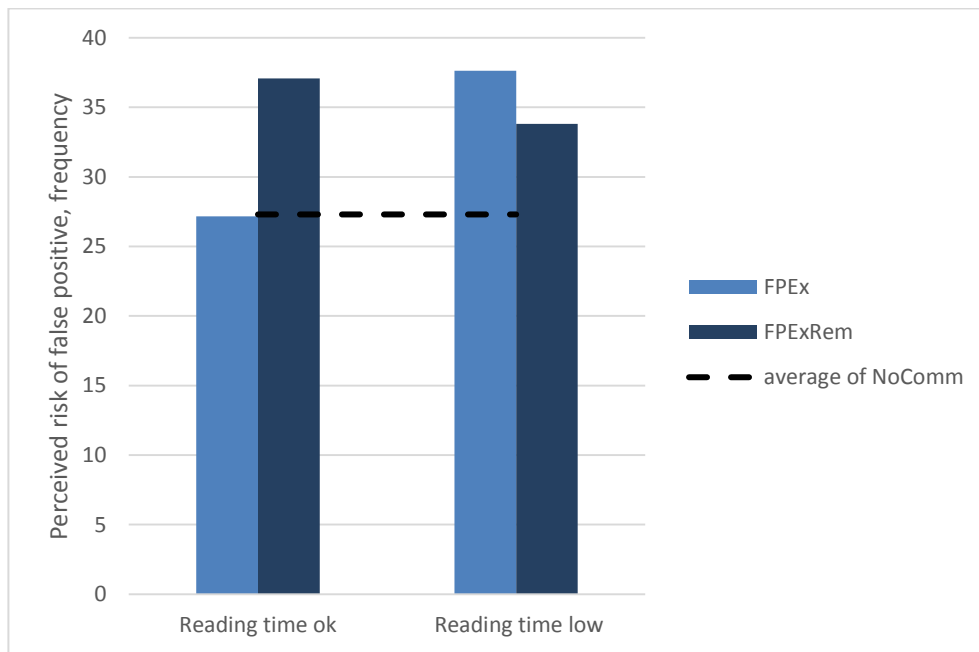


Figure G1. Reading time as a moderator of the effect of FPEX (vs. FPEXRem) on perceived risk of a false positive, measured as a frequency. Reading time groups were created by dividing participants into those with an abnormally brief reading time (less than half of the median reading time for their respective condition) and those with a reading time equal to or greater than half the median.

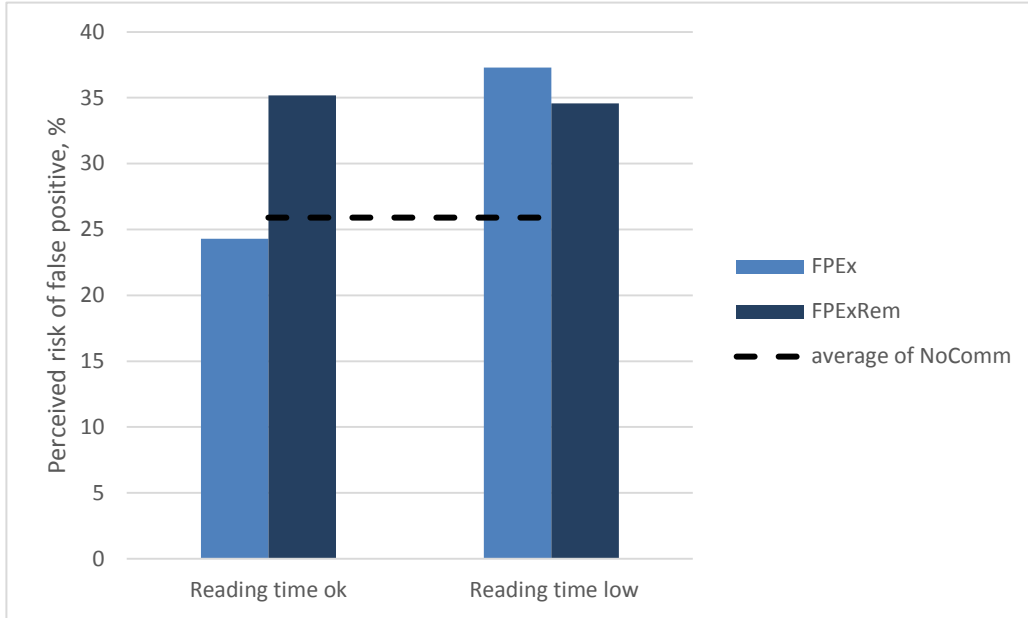


Figure G2. Reading time as a moderator of the effect of FPEX (vs. FPEXRem) on perceived risk of a false positive, measured as a percentage. Reading time groups were created by dividing participants into those with an abnormally brief reading time (less than half of the median reading time for their respective condition) and those with a reading time equal to or greater than half the median.

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