

COMPARING THE EFFECTIVENESS OF “INDIVIDUAL-LOSS” AND “FAMILY-LOSS”
MESSAGES IN PROMOTING MAMMOGRAPHY

Xiaokun Qian

A thesis submitted to the faculty at the University of North Carolina at Chapel Hill in partial fulfilment of the requirements for the degree of Master of Arts in the School of Journalism and Mass Communication (Interdisciplinary Health Communication).

Chapel Hill
2014

Approved by:

Brian G. Southwell

Maria Leonora G. Comello

Jonathan S. Slater

©2014
Xiaokun Qian
ALL RIGHTS RESERVED

ABSTRACT

Xiaokun Qian: Comparing the effectiveness of “individual-loss” and “family-loss” messages in promoting mammography
(Under the direction of Brian Southwell)

The study compared the effectiveness of two loss-framed messages, namely, graphics and text therein with individual-loss or family-loss theme, in increasing women’s intention to take and talk about mammogram, and level of negative emotions such as sadness. Moderating effect of number of children living in the family, age of the youngest child, and women’s marital status was also assessed.

Two hundred females were randomly assigned to view either the individual-loss or family-loss message and completed a questionnaire assessing the aforementioned outcomes. After controlling for confounders, multiple regression revealed no significant difference in intention to take or talk about mammogram between the two groups. However, family-loss message induced significantly more sadness compared to the individual-loss message. Multiple regression with interaction indicated that number of children living in the family is a moderator for group effect on intention to talk about mammogram. These results may guide future design of mammogram promotion materials.

To my beloved mother who passed away from cancer at the age of 56.

ACKNOWLEDGEMENT

I would like to thank Dr. Brian Southwell, Dr. Nori Comello and Dr. Jonathan Slater for agreeing to serve on my committee and for their helpful guidance and support during the paper writing process and also throughout my Masters journey.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION.....	1
CHAPTER 2: LITERATURE REVIEW.....	4
2.1 Message framing.....	4
2.2 Framing and couple-focused message.....	6
2.3 Women and family.....	7
2.4 Screening intention and family size.....	8
2.5 Dependent children and health behavior.....	9
CHAPTER 3: HYPOTHESES.....	10
CHAPTER 4: METHODS.....	12
4.1 Participants.....	12
4.2 Study Design.....	13
4.3 Conditions.....	13
4.4 Procedure.....	14
4.5 Measures.....	14
4.6 Statistical Analysis.....	17
CHAPTER 5: RESULTS.....	19
5.1 Sample characteristics.....	19
5.2 Manipulation check.....	22
5.3 Hypothesis-specific results.....	22
5.4 Probing of the interaction.....	30
5.5 Supplementary analysis.....	35
CHAPTER 6: DISCUSSION.....	38

CHAPTER 7: CONCLUSION.....	42
APPENDIX A: SURVEY QUESTIONNAIRE.....	43
APPENDIX B: MECHANICAL TURK RECRUITMENT POST.....	50
APPENDIX C: INTERVENTION MATERIALS.....	51
REFERENCES.....	53

LIST OF TALBES

Table 5.1 Summary of demographic variables by study group.....	21
Table 5.2 Estimated mean outcome measures by study group adjusting for race, education, income, and mammogram history.....	25
Table 5.3 Moderating effect of having children in the family unit on the group difference.....	29
Table 5.4 Moderating effect of marital status on the group difference	32
Table 5.5 Moderating effect of the age of youngest child on the group difference.....	34

LIST OF FIGURES

Figure 5.1 Moderating effect of having children living in the family unit on group difference	28
--	----

CHAPTER 1: INTRODUCTION

Breast cancer is the second most common cause of cancer death among women of all races in the United States (Centers for Disease Control and Prevention [CDC], 2013). Although mammography is one of the most effective screening tests to reduce breast cancer mortality (Mandelblatt et al., 2009), in 2010 up to 30% of American women aged 50 to 74 did not have the screening over the past two years (CDC, 2012). Message framing (i.e., loss frame and gain frame) may be a strategy to increase mammography utilization (Banks et al., 1995). Loss frame focuses on the negative consequences by not taking a particular behavior whereas gain frame focuses on the benefits by taking a particular behavior (Abood, Black, & Coster, 2005). Although prior studies show the advantage of loss frame over gain frame in motivating illness detection behavior like mammography (Abood, Coster, Mullis, & Black, 2002; Abood et al., 2005; Banks et al., 1995; Cox & Cox, 2001; Salovey & Williams-Piehota, 2004; Schneider et al., 2001), little is known about how different themes within loss frame would affect message effectiveness.

In the real world, two themes of loss-framed messages (i.e., individual loss and family loss) are widely used in health promotion. However, the specific relative effects of the two have not been sufficiently studied. Individual loss refers to the negative outcome imposed on the person him/herself. For example, in *CDC's Tips from Former Smokers Campaign*, a woman lost her throat by not being able to quit smoking (CDC, 2013). Family loss refers to the negative consequences on family members, such as the loss of their loved one and various impact attached

to that loss, *e.g. CDC's Screen for Life Campaign*, a son talking about his emotional stress from losing his mother to colon cancer (CDC, 2014).

In the context of mammography, these two themes (individual-loss vs. family-loss) are of interest for further examination, especially considering women's strong attachment to their family (Van Honk et al., 2011). It is reasonable to assume that women want to avoid the negative consequences on their family members caused by themselves not taking a particular preventive behavior.

The messages tested in this study were adapted from direct mailing materials used by Minnesota Department of Health (see appendix). The materials were originally designed for SAGE, a program that offers free mammogram to un- and under-insured women in Minnesota (MDH, 2013). These materials present clear themes of both individual-loss and family-loss according to the definition given before.

The questions guiding our present investigation are whether family-loss message is more effective than individual-loss message in a) increasing intention to take mammogram b) increasing intention to talk with family members or healthcare provider about taking mammogram or c) evoking higher level of negative emotion, among U.S. women aged 40 to 74. Answers to these questions can help fill the gap of literature and has implications on future material design.

The reasons to select the above outcomes to assess effectiveness are briefly described as follows. Screening intention is a primary outcome as it is a strong predictor of behavior, according to the Theory of Planned Behavior (Ajzen, Albarracín, & Hornick, 2007). Intention to talk with family members and healthcare provider about mammography is a secondary outcome as Southwell and Yzer (2007) suggested conversation may amplify campaign effects. Negative

emotion is the third outcome, because it has been identified as a key variable on the psychological pathway to persuasion (Dillard & Nabi, 2006). For example, sadness can encourage reflection on the consequences of failure to take preventive action (Dillard & Nabi, 2006).

CHAPTER 2: LITERATURE REVIEW

2.1 Message Framing

A large amount of work on message framing is based on Prospect Theory (Kahneman & Tversky, 1979). Prospect Theory suggests that when gain is salient, people are risk averse; when loss is prominent, people are risk seeking. Level of perceived risk is associated with different types of behaviors. Health prevention behavior such as wearing a seat belt or applying sunscreen is perceived to have low or no risk. Therefore gain frame is more effective in encouraging prevention behaviors, a low-risk choice (Rothman, Salovey, Antone, Keough, & Martin, 1993). Disease detection behavior such as having breast self-exam or cancer screening is perceived to be risky, as there is a possibility of detecting life-threatening tumor. Therefore loss frame is more effective in promoting detection behaviors, a riskier choice (Meyerowitz & Chaiken, 1987).

Salovey and Williams-Piehota (2004) further confirmed the findings in their review on gain- and loss-framed messages. They found that gain-framed messages are generally more effective at promoting prevention behaviors such as mouthwash and sun screen use, whereas loss-framed messages are more effective at promoting detection behaviors such as cancer screening.

Overall, existing body of literature shows loss-framed message is more effective than gain-framed message in promoting mammography utilization. Banks and colleagues (1995) conducted a randomized experiment to compare the effectiveness of gain-framed and loss-framed messages among one hundred and thirty-three women 40 years and older. Screening rate

within 12 months of intervention is marginally significantly higher in women exposed to a loss-framed video than in women exposed to a gain-framed video.

Cox and Cox (2001) conducted a 2 by 2 randomized controlled experiment on 174 women over the age of 50 from a Midwestern metropolitan area to investigate the effect of anecdotal and statistical messages as well as positive (gain) and negative (loss) anecdotal messages on promoting breast cancer detection behaviors. They authors found that anecdotal messages are more involving than statistical messages and that negative anecdotes are more persuasive than positive anecdotes. Moreover, the authors showed that the predicted behavioral change is mediated by the belief and attitude changes.

Schneider et al. (2001) designed an experiment to assess the effect of gain or loss framed as well as ethnic group-specific or multicultural mammogram promoting videos in 752 low-income women over 40 years of age from community health clinics and public housing developments. It was shown that loss-framed multicultural messages were the more persuasive. The advantage of loss-framed multicultural messages was more prominent among Anglo and Latino women than African American women.

Abood et al. (2005) compared the effect of loss-framed telephonic message to the “usual” telephonic message among women of age 50 to 64 who were un- or under-insured from 17 counties in rural area of Florida. Catchment areas were randomly selected within counties to serve as the experimental and comparison groups. The authors found that women received the loss-framed message were twice more likely to obtain a mammogram than those received the usual message.

A meta-analysis conducted by O’Keefe and Jensen (2009) found no significant difference in message effectiveness between loss frame and gain frame for general illness detection

behaviors. However, in mammography screening, loss-framed message was still found to have a small but significant advantage over gain-framed message. The author hypothesized that males and females maybe differently susceptible to loss-framed messages. After a further examination on the association of proportion-of-female-participants and effect size among all cases, the hypothesis was not supported.

2.2 Framing and Couple-focused Message

There is only one study that is close to the current study that examined a family-focused message on smoking cessation.

Lipkus, Ranby, Lewis, and Toll (2013) recently conducted a randomized experiment investigating the framing effect of cessation messages on smoking couples. The two aspects of message framing they investigated are gain vs. loss and individual vs. couple. Based on the family systems and interpersonal theories they predicted that interventions highlighting shared, joint, or communal aspects of quitting smoking were more effective than those focused on individuals. A 2 by 2 factorial design was used to assess the effects of the two factors (gain/loss and individual/couple). Four sets of text-only intervention materials based on the combination of the two factors were randomly assigned to 40 couples recruited from central North Carolina. The authors found that loss frame messages were more effective at producing desire to quit smoking than gain frame messages. More interestingly, couple-focused messages were found to be more effective at producing desire to quit smoking than individual-focused messages. There were no significant interactions between outcome focus and message framing. Moreover, couple-focused messages were more effective at inducing behavioral change at 1 month follow-up than individual-focused messages as demonstrated by the significant fewer daily cigarettes

consumption in the former condition than the latter one. Although this study is different from my study in that couples rather than women (including married and unmarried) were exposed to the interventions, the evidence that couple-focused messages are more effective than individual-focused messages still provides some support and basis that family-focused message may potentially have a larger effect than individual-focused message.

2.3 Women and Family

Given the focus of the family-loss message on the potential impact on the mother, it is necessary to review the literature on women and family.

Although the women's role in a family has changed drastically over the past several decades, they remain to take on great responsibilities in domestic activities such as childcare and homemaking (De Coster & Zito, 2013) and share some of the characteristics in their traditional-role such as being nurturing, supportive, and directed to family (Harway & Nutt, 2006). This further explains why women struggle to find balance between family and work (Perrone, Wright, & Jackson, 2009).

In 2011, mothers spent twice as much time (13.5 hours per week) as fathers do (7.3 hours per week) with their children and twice as much time on household chores as fathers (Pew, 2013). Ferriman, Lubinski and Benbow (2009) found that women value time with family more than men especially after having children. Van Honk et al. (2011) found that females on average outperform males on measures of cognitive empathy, which might be seen as one reason for greater attention to child. Also childcare pattern may be explained by the biological and evolutionary characteristics rooted in women, for example, more oxytocin in the body which enhances nurturing (Rhoads & Rhoads, 2012).

In addition, women nowadays join labor force and make important contribution to family income (Perrone et al., 2009). In other words, the family has become more dependent on woman's ability to work and to generate income. Consequently, the family would financially suffer ever more from the loss of the woman. This might also account for a negative impact on families that women would make every effort to avoid.

Thus, given the substantial potential contributions of women to the emotional and financial well-being of the family, there is a potential effect of family-loss message on women.

2.4 Screening Intention and Family Size

Previous literature showed a mixed result for the relationship between number of children and screening behavior. Using 2004–2006 Medical Expenditure Panel Surveys (MEPS) data, Stimpson, Wilson and Reyes-Ortiz (2009) found that women who have no children in a family are 1.3 times more likely to report having mammogram than women who have one child (CI: 0.69, 0.82) and 1.6 times more likely than women who have two or more children in the household (CI: 0.55, 0.66). Having children is considered a blocking rather than facilitating factor to obtain mammography, since mothers have less time to get screening (Stimpson et al., 2009). The parenting role makes mothers prioritize their children's need rather than their own health (Stimpson et al., 2009). However, this view is not fully supported by the study conducted by Brown, Gibney and Tarling (2013), as the finding indicated women with more dependent children and higher self-efficacy showed greater mammography re-attendance likelihood compared to women with fewer other dependents and lower self-efficacy.

The literature above showed that there is some association between family size and screening intention. The current study further tested the moderating effect of family size on group difference in screening intention.

Although having children may serve as a blocking factor to breast cancer screening, the above studies did not use “family-loss” materials as stimuli to prime women into thinking about the negative consequences on family. The current study intended to fill the gap.

2.5 Dependent Children and Health Behavior

Jarvis (1996) found that adults with dependent children were more likely to have given up smoking than those without, after adjustment for a wide range of potential confounding variables. This shows that having dependent children or not is associated with some type of health behavior. Since both Jarvis (1996) and Brown et al. (2013) assessed number of dependent children, it raised an interesting point whether the age of the child will induce a difference on group effect.

CHAPTER 3: HYPOTHESIS

Besides assessing the outcome variables such as the intention to take or talk about mammogram and negative emotion, the moderating effect of family size, age of the youngest child is also of interest, based on previously reviewed literature (Stimpson et al., 2009; Jarvis, 1996; Brown et al., 2013). In addition, marital status is also of interest. A very important reason to identify the aforementioned moderators is that the family-loss message originally developed by Minnesota Department of Health and tested in this study presented a theme which includes a married couple and two young children (see appendix). It is natural to see if women under similar situation can relate to the characters in the family-loss message more easily, that is, the family-loss message can potentially have a larger effect for women who are married, have bigger family size and younger children. The hypotheses are listed below.

Primary Hypothesis

1. The intention to get mammography will be higher among those exposed to a “family-loss” message than among those exposed to an “individual-loss” message.

Secondary Hypotheses

2. The intention to talk with family member or healthcare provider about mammography will be higher among those exposed to a “family-loss” message than among those exposed to an “individual-loss” message.

3. The degree of negative emotion in the “family-loss” group will be significantly higher than that in the “individual-loss” group.
4. The difference between the two study groups in the outcomes specified in hypothesis 1, 2, and 3 above will increase as the number of children goes up.
5. The difference between the two study groups in the outcomes specified in hypothesis 1, 2, and 3 will be larger in married women than that in single women.
6. The difference between the two study groups in the outcomes specified in hypothesis 1, 2, and 3 will increase as the age of the youngest child decreases.

CHAPTER 4: METHODS

4.1 Participants

Two hundred female participants aged 40 to 74 years old were recruited on Amazon's Mechanical Turk (MTurk) for this study. MTurk is a crowdsourcing Internet marketplace for getting work done by others (Buhrmester, Kwang, & Gosling, 2011). Previous studies in the field of social sciences found that MTurk provides a source for inexpensive yet quality data (Buhrmester, Kwang, & Gosling, 2011; Berinsky, Huber, & Lenz, 2012; Paolacci, Chandler, & Ipeirotis, 2010). To be eligible for the study, participants also had to be able to read English, live in the US but outside the state of Minnesota, and have no breast cancer history.

The reasons to set the starting age at 40 instead of 50 recommended by the U.S. Preventive Services Task Force (2009) are several. First there is no consensus on the optimal age for women to start mammography screening, yet this topic remains controversial and open to debate. Both the American Cancer Society and American Congress of Obstetricians and Gynecologists stated in their latest guideline that women should start annual mammography at the age of 40 (American Cancer Society [ACS], 2013; American Congress of Obstetricians and Gynecologists [ACOG], 2011), since the benefit of catching cancer early outweighs the potential harm such as false-positive result and overtreatment (ACOG, 2011), which USPSTF used as rationale against early age screening (Allen & Pruthi, 2011). Second, the original materials developed by Minnesota Department of Health are intended to target females aged 40-74. To

ensure consistency, I want to stick with this age group. Finally, having a sample of women aged 40 to 49 is important to this study as they have a higher probability of having younger children.

Participants were outside Minnesota since the intervention materials were originally from Minnesota Department of Health and were distributed there. The purpose of pre-screening is to reduce the effect of repeated exposure, as literature suggested that messages presented repeatedly tend to lose their impact (Bornstein, 1989). Participants who have breast cancer history were excluded because mammography may become a routine test to check progression or reoccurrence rather than a preventive screening, which is against the purpose of this study to examine the effectiveness in motivating preventive behavior.

4.2 Study Design

The study used a post-only between-subjects experiment design. Participants were evenly randomized to one of the conditions to view either an individual loss message or a family loss message. The study was approved by University of North Carolina Institutional Review Board.

4.3 Conditions

The intervention materials were adapted from direct mailing materials used by Minnesota Department of Health. The materials were originally designed for SAGE, a program that offers free mammogram to un- and under-insured women in Minnesota (MDH, 2013). The adapted versions contained half graphic and half text. MDH's logo was removed and so was program-specific information such as program phone number.

Theme difference was mainly presented by graphics and text related to the graphics, and words on recommendation on the third page are exactly the same (see appendix). Manipulation

checks were run. Other checks on appearance and quality of the ad were also run to ensure equivalence on other variables besides theme difference.

4.4 Procedure

Survey was developed in Qualtrics and was distributed through Amazon Mechanical Turk (MTurk). Two criteria were set on MTurk before the task was posted. First, task takers should live in the U.S. Second, they must have a record of 95% approval rate of previous tasks. A short description on this task was posted (see appendix).

The first page of survey served as a consent form. After participants gave consent, they were pre-screened using criteria listed in the “participant” section (see survey questionnaire in appendix). Eligible participants who also completed the survey were given an incentive of one dollar paid to their MTurk account, however, due to the limited funding situation, the latter half (n=100) of the participants were given 0.5 dollar each as incentive to complete the task. Details of sample characteristics between the two batches were described in results section.

At the very beginning of the survey, participants viewed the promotional materials and then completed questions based on the materials. Questions about the number of children and marital status were assessed after the completing material-related questions. The purpose is to eliminate any influence of family-related questions on processing of materials and also to avoid the possible feeling of being manipulated before viewing materials.

4.5 Measures

Screening intention is the primary outcome variable. Behavioral intention scale developed by Montano and Taplin (1991) to measure mammography intention was adapted for

this study. The one item scale assessed “intention” by asking participants “how likely it is that you will get a mammogram done within the next two years”. A seven-point bipolar scale was used with end points labeled “extremely likely” and “extremely unlikely”, with ‘neither’ as the midpoint.

Intention to talk/discuss mammography (Southwell & Yzer, 2007) is the secondary outcome variable. It was assessed by asking participants “After viewing the material, how likely are you going to talk with your family members or your healthcare providers about mammography over the next two weeks?” A seven-point scale from “not likely at all” to “extremely likely” was used.

Negative emotion was the secondary outcome variable. It was assessed by three variables “sad”, “fearful” and “guilty” (Dillard & Peck, 2001; Dillard & Nabi, 2006). Emotions were treated separately since existing literature indicates that discrete emotions perspective has greater power in predicting message effectiveness than the dual-systems approach (negative and positive affects) (Dillard & Peck, 2001; Dillard & Nabi, 2006). Also statistical analysis in previous studies reveals a diversity of effects among negative emotions on attitude toward advertisement or message effectiveness (Dillard & Peck, 2001; Dillard, Plotnick, Godbold, Freimuth, & Edgar, 1996; Huang, 1997). In the current study, participants were asked to rate the above three variables (sad, fearful and guilty) discretely on a five-point scale ranging from “not at all” on the left end to “a lot” on the right end.

Positive emotion was also assessed to make sure there was no such unintended emotion induced by either promotion materials (Dillard & Peck, 2001). Participants were asked to rate three emotions (happy, amused, up-beat) discretely on a five-point scale anchored “not at all” on the left end and “a lot” on the right end.

Number of children was a moderator and was defined as number of own children living in the family unit, including adopted and step-children and will be scored as a continuous variable, starting from “0”. The definition comes from Jarvis’ study (1996) which examined the relationship between family size and smoking cessation.

The age of the (youngest) child was a moderator and was measured by asking participants “what is the age of your child? (If more than one, write down the age of your youngest child) and was scored as a continuous variable.

Marital status was a moderator and was accessed by asking “are you currently married?” A dichotomous “yes” and “no” option will be given.

Other demographic and socioeconomic variables including **age, race, income level, education level** and **whether having health insurance** was accessed using the same items in CDC’s Behavioral Risk Factor Surveillance System Questionnaire (BRFSS, 2013).

Mammogram History was measured by asking participants “have you had a mammogram in the past two years?” A dichotomous “yes/no” answer was given.

Attitude towards mammography was also assessed by asking participants “getting a mammogram within the next two years would be...” Two five-point Semantic Differential Scales (Mitchell & Olson, 1981) bad/good, unimportant/important were used. **Norm** was assessed by asking participants to rate “people important to me would approve of me getting a mammogram in the next two years” on a five-point Likert scale with one indicating strongly disagree and five indicating “strongly agree”.

Appearance of the ad was assessed by asking participants “how do you like the following elements of the ad?” Participants rated color, layout, attractiveness of character(s) and overall appearance on a five-point Likert Scale with one indicating “dislike very much” and five

indicating “like very much”. **Quality of the ad** was assessed by asking participants to rate the following statement “I think the material is professionally designed” on a seven-point Likert Scale from “strong disagree” to “strongly agree”.

4.6 Statistical Analysis

Normally distributed continuous variables were summarized using mean and standard deviation. Non-normally distributed continuous variables were summarized using median and quartiles. Categorical variables will be summarized using frequency and percentage.

As shown in previous studies, age, race, income, education level and health insurance status, attitudes toward mammography and norms are associated with women’s intention to take mammogram (Champion, 1994; Katz & Hofer, 1994; Kim & Jang, 2008; Rauscher, Allgood, Whitman, & Conant, 2012). Therefore, they were considered as potential confounders in our study. Their distributions were described by intervention groups. Race, income, education, and mammogram history were distributed very differently between the two intervention groups despite the randomization process, they were included in a multiple linear regression model to control for their confounding effect, and the primary hypothesis was tested by testing the regression coefficient of intervention against 0.

Secondary hypotheses 2 and 3 were tested using similar method as that used for the primary hypothesis. Secondary hypotheses 4 to 6 were tested by including interaction terms between intervention and marital status and between intervention and number of children in multiple linear regression models.

All statistical tests were two-sided and were considered significant if the p value is less than or equal to 0.05. All statistical analyses were conducted in SPSS version 21 (SPSS IBM, New York, USA).

CHAPTER 5: RESULTS

5.1 Sample characteristics

Two hundred subjects participated in the study, which random assignment to individual-loss group ($n = 98$) and family-loss group ($n = 102$). The sample was predominantly White (86.4%) with an average age of 49.1. More than half of them were currently married (57.2%), and 62.5% had at least one child. Majority of the participants were covered by some type of health insurance (82.8%), and about half of them reported having a mammogram in the last two years (47.5%). The education level of the sample was high, with the vast majority reporting having at least some college (93.0%). In concordance with the education level, the income level was fairly high too, with half of the women having more than \$50,000 per year and only 11.5% having less than \$15,000 per year.

Due to logistic reason, the subjects were recruited in two batches of 100 each. Subjects in the two batches were offered different amount of incentive (1 dollar vs. 0.5 dollar). The sample characteristics were compared between the two batches. No significant difference was found for any variables except race ($p = 0.013$ from Fisher's exact test). However, given that subjects were randomly assigned study groups in both batches, the difference in race between batches will not affect the comparison between study groups.

The group-specific characteristics are summarized in Table 5.1. It seems that the distribution of race, income, education, and mammogram history are slightly unbalanced between the two study groups while other demographic variables are well balanced. Therefore, these four variables were included in multiple regression models as covariates along with study group to control for their potential confounding effects. All four covariates were used as categorical variables in the regression analyses. Due to refusal to respond and missing data in these covariates, a total of 191 subjects were used in the multiple regression models.

Table 5.1. Summary of demographic variables by study group

Variable	Individual (N = 98)	Family (N = 102)	Overall (N = 200)
Age, mean (SD)	49.0 (7.3)	49.2 (8.1)	49.1 (7.7)
Number of Children, mean (SD)	1.3 (1.4)	1.4 (1.6)	1.4 (1.5)
Age of the youngest children, mean (SD) ¹	16.2 (8.9)	15.9 (9.2)	16.0 (9.0)
Race, N (%)			
White	81 (83.5)	91 (89.2)	172 (86.4)
Black	9 (9.3)	6 (5.9)	15 (7.5)
Other	7 (7.1)	5 (4.9)	12 (6.0)
Hispanic, N (%)	6 (6.1)	5 (4.9)	11 (5.5)
Currently married, N (%)	55 (58.5)	56 (56.0)	111 (57.2)
Income, N (%)			
<= \$15,000	8 (8.2)	15 (14.7)	23 (11.5)
\$15,001 to \$50,000	34 (34.7)	36 (35.3)	70 (35.0)
>= \$50,001	54 (55.1)	47 (46.1)	101 (50.5)
Do not wish to respond	2 (2.0)	4 (3.9)	6 (3.0)
Having insurance, N (%)	80 (82.5)	84 (83.2)	164 (82.8)
Had mammogram in the past 2 years, N (%)	48 (49.5)	46 (45.6)	94 (47.5)
Education, N (%)			
Never attended school	1 (1.0)	0 (0)	1 (0.5)
Grade 1 through 8 (elementary)	1 (1.0)	0 (0)	1 (0.5)
Grade 9 through 11 (some high school)	5 (5.1)	7 (6.9)	12 (6.0)
College 1 to 3 years (some college or tech school)	34 (34.7)	53 (52.0)	87 (43.5)
College 4 years or more (college graduate)	57 (58.2)	42 (41.2)	99 (49.5)
Attitude towards getting mammogram, mean (SD)			
Bad/good ²	4.6 (0.77)	4.7 (0.79)	4.7 (0.77)
Unimportant/important ³	4.6 (0.87)	4.7 (0.75)	4.7 (0.81)
Norm for getting a mammogram, mean (SD) ⁴	6.5 (0.94)	6.6 (0.83)	6.6 (0.89)

1. Based on 125 subjects with at least one child living in the family unit

2. See Item 5.1 of the questionnaire in the appendix

3. See Item 5.2 of the questionnaire in the appendix

4. See Item 6 of the questionnaire in the appendix

5.2 Manipulation check

Manipulation was successful. The paired t-test between scores of comprehension question 2 (the message involves a family) and comprehension question 1 (the message involves an individual) in the individual-loss group is highly significant (mean score difference = -2.5, 95% confidence interval = (-3.1, -1.9), $t(97) = -8.69$, $p < 0.001$). Similarly, the paired t-test in the family-loss group is also highly significant (mean score difference = 2.0, 95% confidence interval = (1.5, 2.4), $t(101) = 8.4$, $p < 0.001$). Therefore, there is strong evidence that the participants correctly comprehended the main theme of the message they were assigned to view.

5.3 Hypothesis-specific results

Hypothesis 1: Intention to get screened

The first hypothesis predicted that the intention to get mammography will be higher among those exposed to a “family-loss” message than among those exposed to an “individual-loss” message. The average scores of intention to get mammogram are 5.78 (SD = 1.76) and 6.15 (SD = 1.41) for the individual-loss and family-loss group, respectively. The multiple regression analysis controlling for the aforementioned covariates shows no significant difference in the intention scores between the two groups ($\beta = 0.35$, 95% confidence interval = (-0.08, 0.79), $t(180) = 1.59$, $p = 0.112$). The multiple regression gives an R^2 of 0.1. Therefore, H 1 was not supported.

Hypothesis 2: Intention to talk about mammography

The second hypothesis predicted that the intention to talk with family member or healthcare provider about mammography will be higher among those exposed to a “family-loss” message than among those exposed to an “individual-loss” message. The average scores of

intention to talk about mammogram are 4.45 (SD = 2.01) and 4.58 (SD = 1.86) for the individual-loss and family-loss group, respectively. The multiple regression analysis showed that there is no significant difference in the intention scores between the two groups ($\beta = 0.18$, 95% confidence interval = (-0.36, 0.71), $t(180)=0.64$, $p = 0.517$). The multiple regression gives an R^2 of 0.1. Therefore, H2 was not supported.

Hypothesis 3: Level of negative emotion

The third hypothesis predicted that the degree of negative emotion in the “family-loss” group will be significantly higher than that in the “individual-loss” group.

As mentioned in the *Dependent Variables* section, negative emotions were measured by three variables: sad, guilty, and fearful. The mean scores of sad are 3.38 (SD = 1.27) and 3.65 (SD = 1.06) in the individual-loss and family-loss group, respectively. The mean scores of guilty are 2.16 (SD = 1.17) and 1.86 (SD = 1.07) in the individual-loss and family-loss group, respectively. The mean scores of fearful are 2.84 (SD = 1.23) and 2.75 (SD = 1.36) in the individual-loss and family-loss group, respectively.

Multiple regression on emotional variable *sad* reveals significant difference between groups ($\beta = 0.33$, 95% confidence interval = (0.00, 0.66), $t(180)=1.97$, $p = 0.049$). The multiple regression gives an R^2 of 0.07. Therefore there is evidence after controlling for potential confounders that the participants who viewed the family-loss message felt sadder than those who viewed the individual-loss message.

Multiple regression on emotional variable *guilty* reveals no significant difference between groups ($\beta = -0.19$, 95% confidence interval = (-0.51, 0.12), $t(180)=-1.22$, $p = 0.222$). The multiple regression gives an R^2 of 0.1. So there is no evidence that supports the hypothesis that

the level of guilty feeling is higher among those in the family-loss group than those in the individual-loss group.

Multiple regression on emotional variable *fearful* reveals no significant difference between groups ($\beta = -0.03$, 95% confidence interval = $(-0.40, 0.34)$, $t(180) = -0.16$, $p = 0.874$).

The multiple regression gives an R^2 of 0.06. So there is no evidence that supports the hypothesis that the level of fearful feeling is higher among those in the family-loss group than those in the individual-loss group.

The confounder-adjusted mean of all outcomes for the two study groups as well as the between-group difference and corresponding p values are summarized in Table 5.2.

Therefore, H3 was partially supported that only the degree of sadness in the “family-loss” group is significantly higher than that in the “individual-loss” group.

Table 5.2. Estimated mean outcome measures by study group adjusting for race, education, income, and mammogram history

Outcome	Scale	Individual	Family	Difference	P value	
Intention						
Intention to talk about mammogram	1-7	5.19	5.36	0.18	0.517	
Intention to get mammogram in the next 6 months	1-7	5.83	6.18	0.35	0.112	
Negative emotion						
Sad	1-5	3.40	3.74	0.33	0.049	*
Guilty	1-5	2.69	2.49	-0.19	0.222	
Fearful	1-5	3.12	3.09	-0.03	0.874	
Positive emotion						
Happy	1-5	1.70	1.68	-0.02	0.771	
Amused	1-5	1.87	1.84	-0.03	0.716	
Upbeat	1-5	1.96	1.92	-0.04	0.598	
Attitude towards the material						
Boring / interesting	1-7	3.78	3.79	0.01	0.958	
Unappealing / appealing	1-7	4.57	4.46	-0.11	0.605	
Not likable / likable	1-7	4.11	4.20	0.09	0.677	
Appearance and quality						
Color	1-5	3.51	3.77	0.26	0.075	
Layout	1-5	3.72	3.94	0.23	0.111	
Attractiveness of the characters	1-5	3.75	4.10	0.36	0.006	*
Overall appearance	1-5	3.73	3.88	0.16	0.266	
Professionalism	1-7	4.91	4.84	-0.07	0.740	
Attitude towards getting mammogram in the next two years						
Bad / good	1-5	4.12	4.15	0.04	0.724	
Unimportant / important	1-5	4.74	4.78	0.05	0.680	
People approve me of getting mammogram in the next two years	1-7	6.17	6.31	0.13	0.279	

Hypothesis 4: Moderating effect of number of children living in the family unit

The fourth hypothesis predicted that difference between the two study groups in the outcomes specified in hypothesis 1, 2, and 3 will increase as the number of children goes up.

To investigate the moderating effect of number of children living in the family unit on the group difference for the above tested outcomes (intention to do mammogram, intention to talk about mammogram, level of sad, guilty, and fearful), a multiple regression with aforementioned confounders plus the main effect of number of children living in the family unit and the interaction between it and study group was performed for each of the outcomes. The number of children was treated as a continuous variable in the analysis. None of the regression coefficients of the interaction terms is significant in the five regression models. Therefore, there is no evidence that there is any moderating effect of number of children living in the family unit on the group difference. H4 was not supported.

Stimpson et al. (2009) classified women into three groups (having no children, having 1 child, having more than 1 child) and found that women with no children are significantly different from the other two groups in terms of screening intention. Since the result indicated that there is some difference between women who have children and those who have not, I further dichotomized women into two groups (living with children and living without children) and investigated the moderating effect of having children in the family unit or not on the group difference. Similarly regression analyses were conducted with the interaction terms between group and having children in the family unit. It is found that there is a significant interaction effect for the outcome of intention to talk about mammogram ($\beta = -1.17$, 95% confidence interval = $(-2.25, -0.10)$, $t(180) = -2.13$, $p = 0.033$). The multiple regression gives an R^2 of 0.13. Therefore, after controlling for potential confounders, the difference in the score of intention to

talk about mammogram between family-loss and individual-loss group is significantly smaller among women living with children than those not living with children. The moderating effect of having children in the family unit is illustrated in Figure 5.1. Based on the regression model, women not living with children who viewed the individual-loss message has a mean score of intention to talk of 4.39 (SE=0.64). Women living with children who viewed the individual-loss message has a mean score of intention to talk of 5.42 (SE=0.57). Women not living with children who viewed the family-loss message has a mean score of intention to talk of 5.28 (SE=0.65). Women living with children who viewed the family-loss message has a mean score of intention to talk of 5.13 (SE=0.60). The interaction terms for other outcomes are not significant, and are summarized in Table 5.3.

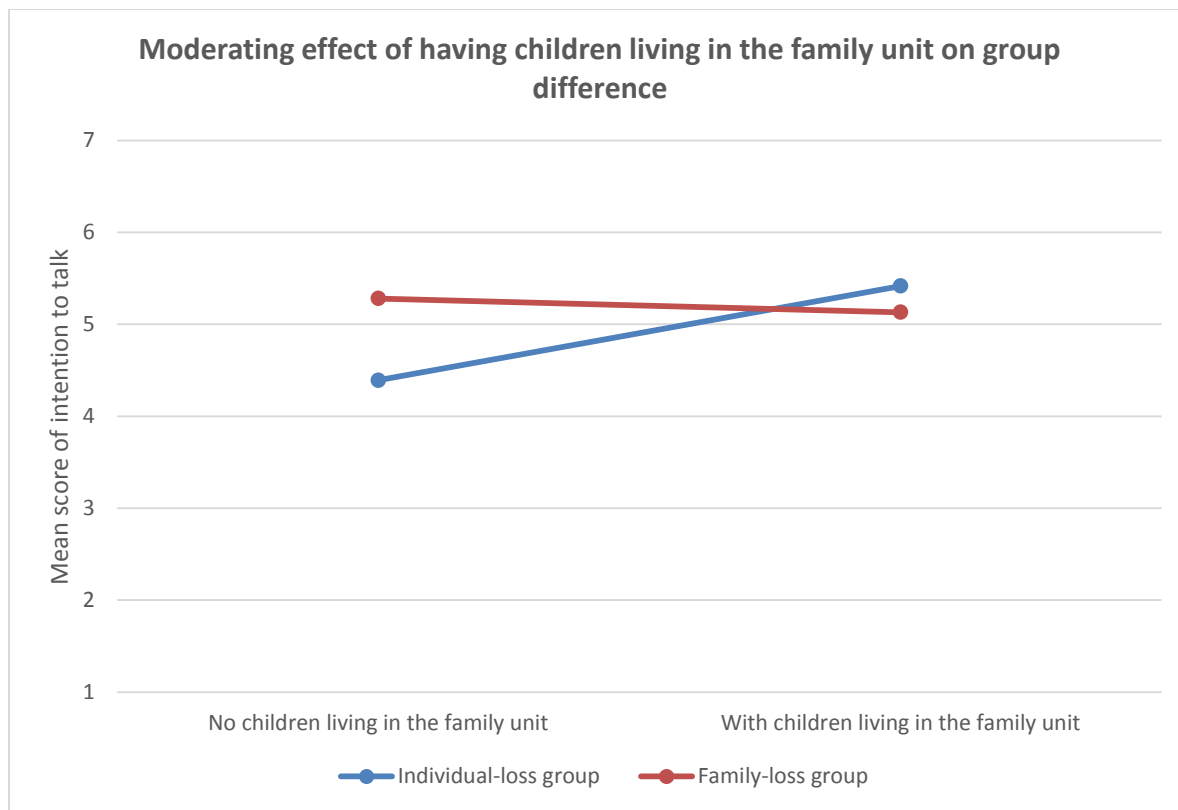


Figure 5.1. Moderating effect of having children in the family unit on group difference in intention to talk about mammogram.

Table 5.3. Moderating effect of having children in the family unit on the group difference

Outcome	β^*	95% confidence interval	P value	
Intention				
Intention to talk about mammogram	-1.17	-2.25 to -0.10	0.033	*
Intention to get mammogram in the next 6 months	0.35	-0.52 to 1.23	0.429	
Negative emotion				
Sad	-0.40	-1.08 to 0.27	0.239	
Guilty	-0.06	-0.70 to 0.58	0.846	
Fearful	-0.06	-0.70 to 0.58	0.846	
Positive emotion				
Happy	0.01	-0.26 to 0.28	0.924	
Amused	0.04	-0.29 to 0.37	0.808	
Upbeat	-0.14	-0.47 to 0.19	0.415	
Attitude towards the material				
Boring / interesting	0.28	-0.52 to 1.07	0.499	
Unappealing / appealing	0.08	-0.74 to 0.90	0.846	
Not likable / likable	-0.14	-0.99 to 0.70	0.743	
Appearance and quality				
Color	-0.36	-0.94 to 0.22	0.227	
Layout	-0.19	-0.76 to 0.37	0.502	
Attractiveness of the characters	-0.19	-0.71 to 0.33	0.476	
Overall appearance	-0.37	-0.93 to 0.18	0.189	
Professionalism	-0.28	-1.15 to 0.59	0.526	
Attitude towards getting mammogram in the next two years				
Bad / good	-0.11	-0.54 to 0.32	0.615	
Unimportant / important	-0.12	-0.57 to 0.32	0.588	
People approve me of getting mammogram in the next two years	0.21	-0.28 to 0.70	0.407	

*Regression coefficient of interaction between study group and having children living in the family unit or not

5.4 Probing of the interaction

Since there is a significant moderating effect of having children in the family unit or not on the group difference in the outcome of intention to talk about mammogram, I conducted subgroup analysis on women living with children ($N = 125$) and women not living with children ($N = 75$) to assess the group effect in these two subgroups separately. Specifically, a multiple regression controlling for the same covariates as in the full sample analysis was performed for each subgroup. It is found that there is no significant difference in the intention to talk about mammogram between individual-loss and family-loss groups for those women living with children ($\beta = -0.36$, 95% confidence interval = $(-1.03, 0.31)$, $t(110) = -1.04$, $p = 0.298$). The multiple regression gives an R^2 of 0.12. However, there is a significant difference in the intention to talk about mammogram between individual-loss and family-loss groups for women not living with children ($\beta = 0.99$, 95% confidence interval = $(0.14, 1.83)$, $t(61) = 2.28$, $p = 0.022$). The multiple regression gives an R^2 of 0.18. Therefore, for women not living with children, those who viewed the individual –loss message are less likely to talk about mammogram with their family members than those who viewed the family-loss message.

Hypothesis 5: Moderating effect of marital status

The fifth hypothesis predicted that the difference between the two study groups in the outcomes specified in hypothesis 1, 2, and 3 will be larger in married women than that in single women.

To investigate the moderating effect of marital status on the group difference for the five outcomes (intention to do mammogram, intention to talk about mammogram, level of sadness, guilt, and fear), a multiple regression with aforementioned confounders plus the main effect of marital status and the interaction between it and study group was performed for each of the

outcomes. None of the regression coefficients of the interaction terms between group and marital status is significant in the five regression models. Therefore, there is no evidence that there is any moderating effect of marital status on the group difference. The estimated regression coefficients of the interaction terms and corresponding p values are summarized in Table 5.4.

Table 5.4. Moderating effect of marital status on the group difference

Outcome	β^*	95% confidence interval	P value
Intention			
Intention to talk about mammogram	-0.75	-1.82 to 0.31	0.166
Intention to get mammogram in the next 6 months	-0.12	-1 to 0.75	0.784
Negative emotion			
Sad	-0.41	-1.09 to 0.26	0.226
Guilty	0.22	-0.41 to 0.85	0.494
Fearful	-0.23	-0.98 to 0.51	0.535
Positive emotion			
Happy	-0.23	-0.98 to 0.51	0.535
Amused	0.09	-0.23 to 0.42	0.570
Upbeat	-0.12	-0.45 to 0.2	0.456
Attitude towards the material			
Boring / interesting	0.24	-0.54 to 1.03	0.547
Unappealing / appealing	0.23	-0.58 to 1.04	0.581
Not likable / likable	0.34	-0.49 to 1.18	0.421
Appearance and quality			
Color	-0.20	-0.78 to 0.38	0.495
Layout	0.03	-0.53 to 0.59	0.920
Attractiveness of the characters	0.06	-0.45 to 0.58	0.813
Overall appearance	0.06	-0.5 to 0.61	0.844
Professionalism	0.06	-0.5 to 0.61	0.844
Attitude towards getting mammogram in the next two years			
Bad / good	-0.17	-0.6 to 0.26	0.436
Unimportant / important	0.04	-0.4 to 0.49	0.844
People approve me of getting mammogram in the next two years	-0.21	-0.7 to 0.28	0.397

* Regression coefficient of interaction between study group and marital status

Hypothesis 6: Moderating effect of age of the youngest child

The sixth hypothesis predicted that the difference between the two study groups in the outcomes specified in hypothesis 1, 2, and 3 will increase as the age of the youngest child decreases.

Since the age of the youngest child is only available for participant living with children, the investigation on the moderating effect of the age of the youngest child living in the family unit on group difference as stated in hypothesis 6 is in effect a subgroup analysis on women living with children. A multiple regression was carried out for each of the five outcomes with adjustment for the same potential confounders as used in the full sample analyses plus the main effect of the age of the youngest child living in the family unit and the interaction between it and study group for those participants living with children. No significance is found in the regression coefficient of the interaction term for any of the five outcomes. The detailed results are summarized in Table 5.5. So there is no evidence to support hypothesis 6 that the difference in the intention to get mammogram, to talk about mammogram, and the level of negative emotions between study groups will increase as the age of the youngest child living in the family unit decreases.

Table 5.5. Moderating effect of the age of youngest child on the group difference

Outcome	β^*	95% confidence interval	P value
Intention			
Intention to talk about mammogram	0.02	-0.05 to 0.58	0.585
Intention to get mammogram in the next 6 months	0.01	-0.04 to 0.61	0.613
Negative emotion			
Sad	0.02	-0.02 to 0.28	0.276
Guilty	0.00	-0.04 to 0.85	0.854
Fearful	0.00	-0.04 to 0.85	0.853
Positive emotion			
Happy	0.00	-0.01 to 0.98	0.979
Amused	0.00	-0.02 to 0.9	0.900
Upbeat	0.00	-0.02 to 0.74	0.741
Attitude towards the material			
Boring / interesting	0.01	-0.04 to 0.68	0.683
Unappealing / appealing	0.02	-0.04 to 0.46	0.461
Not likable / likable	0.02	-0.04 to 0.54	0.541
Appearance and quality			
Color	0.02	-0.01 to 0.24	0.240
Layout	0.01	-0.02 to 0.47	0.470
Attractiveness of the characters	0.00	-0.03 to 0.85	0.853
Overall appearance	0.02	-0.01 to 0.24	0.244
Professionalism	0.02	-0.04 to 0.48	0.485
Attitude towards getting mammogram in the next two years			
Bad / good	0.01	-0.02 to 0.4	0.399
Unimportant / important	0.01	-0.02 to 0.4	0.399
People approve me of getting mammogram in the next two years	0.02	-0.01 to 0.17	0.172

*Regression coefficient of interaction between study group and the age of youngest child

5.5 Supplementary analysis

Level of positive emotion

Supplementary analysis was run to check if there is any unintended positive emotion induced by the two ads and if there is any significant difference in positive emotion scores between the two groups.

Positive emotion was measured by happy, amused, and upbeat. The mean scores of *happy* are 1.14 (SD = 0.54) and 1.09 (SD = 0.48) in the individual-loss and family-loss group, respectively. The mean scores of *amused* are 1.19 (SD = 0.71) and 1.13 (SD = 0.50) in the individual-loss and family-loss group, respectively. The mean scores of *upbeat* are 1.21 (SD = 0.68) and 1.14 (SD = 0.55) in the individual-loss and family-loss group, respectively.

Multiple regression on emotional variable *happy* reveals no significant difference between groups ($\beta = -0.020$, 95% confidence interval = (-0.15, 0.11), $t(180) = -0.28$, $p = 0.771$). The multiple regression gives an R^2 of 0.06. Therefore there is no evidence after controlling for potential confounders that the participants who viewed the family-loss message felt happier than those who viewed the individual-loss message.

Multiple regression on emotional variable *amused* reveals no significant difference between groups ($\beta = -0.030$, 95% confidence interval = (-0.19, 0.13), $t(180) = -0.36$, $p = 0.716$). The multiple regression gives an R^2 of 0.18. So there is no evidence that supports the hypothesis that the level of amused feeling is higher among those in the family-loss group than those in the individual-loss group.

Multiple regression on emotional variable *upbeat* reveals no significant difference between groups ($\beta = -0.043$, 95% confidence interval = (-0.20, 0.12), $t(180) = -0.53$, $p = 0.598$). The multiple regression gives an R^2 of 0.13. So there is no evidence that supports the hypothesis

that the level of upbeat feeling is higher among those in the family-loss group than those in the individual-loss group.

The confounder-adjusted mean of all outcomes for the two study groups as well as the between-group difference and corresponding p values are summarized in Table 5.2.

Appearance and quality of the material

The above statistical analyses identified a marginally significant difference in the feeling of sadness between individual-loss and family-loss group ($p = 0.057$) and a significant difference in the intention to talk about mammogram with family members between the two study groups in women without children ($p = 0.037$). To minimize the possibility that these observed differences in message effectiveness were attributed to the difference in the appearance and quality of the materials rather than the difference in the underlying themes, I compared the participants' opinions on the color, layout, attractiveness of the characters, overall appearance, and the professional design of the messages between the two study groups. The same samples and regression models as used to identify the aforementioned two significant findings were used to analyze these five appearance and quality outcomes. Significant difference between study groups was found in participants' perception of the attractiveness of the characters in the materials ($\beta = 0.36$, 95% confidence interval = (0.09, 0.62), $t(180) = 2.65$, $p = 0.009$). The multiple regression gives an R^2 of 0.10. So those in the family-loss group thought the characters in the message were more attractive than those in the individual-loss group did. Moreover, the same outcome was also found to be significantly different between study groups among women without children ($\beta = 0.47$, 95% confidence interval = (0.03, 0.90), $t(61) = 2.11$, $p = 0.039$). The multiple regression gives an R^2 of 0.21. So among women without children, those in the family-loss group also thought the characters in the message were more attractive than those in the individual-loss

group did. No significant difference was found in any other appearance and quality outcomes.

The detailed results of the analyses on appearance and quality outcomes are summarized in Table

5.2.

CHAPTER 6: DISCUSSION

This paper sought to compare the effectiveness of an “individual-loss” message and “family-loss” message in influencing women’s intention to get mammogram, to talk about mammogram, and in evoking their negative emotions. The paper also examined the moderating effect of having children in the family unit or not, age of the youngest child and marital status on the group difference for screening and talking intention and level of negative emotions.

Overall, there is no evidence that family-loss message induces higher intention for women to take or talk about mammogram compared to the individual loss message. Nevertheless, the direction is right in that the estimated mean differences are both positive (0.37 for intention to get mammogram and 0.13 for intention to talk about mammogram). In addition, the upper bounds of the 95% confidence intervals reached 0.8 and 0.73 for intention to take mammogram and to talk about mammogram, respectively, on a seven point scale, these figures are big enough to have some practical meaning. Therefore, family loss message is still potentially more effective than individual loss message in increasing women’s screening intention and willingness to talk about mammogram. A larger scale study with more participants is needed to confirm the effectiveness.

In terms of evoking negative emotions, family-loss message induces higher level of sadness among female viewers compared to the individual loss message, as the multiple regression analysis revealed significance in group difference. This finding has implication on future material design, as negative emotion like sadness is on the pathway to persuasion (Dunlop,

2010). However, what is worth noting is that the observed difference in the level of sadness may not be solely attributed to the theme difference but attractiveness of characters, as viewers consider the characters on “family-loss” message significantly more attractive than the one in “individual-loss” message, though no difference is found in the liking of color, layout, overall appearance and professional design. There is no evidence that family-loss message makes viewers feel more guilty or fearful in comparison to the individual loss message. These findings suggested that “family-loss” message can elicit more sadness among female viewers.

Group effect on intention to talk about mammogram is moderated by whether having children in the family unit or not, but no evidence that it is moderated by age of the youngest child and marital status. An individual subgroup analysis reveals somewhat surprising yet noteworthy findings that among participants with no children living with them, those in the individual-loss group are less likely to talk about mammogram than those in the family-loss group. Yet among participants that live with children this difference is not observed between the two study groups. Intuitively, one would expect that the effect of family-loss message in comparison to individual-loss message would be more prominent in women living with children than those not living with children. But the observations suggest the opposite. Further research such as qualitative studies is needed to explain the in-depth reason behind it.

There are a number of limitations in the study that require further comment. First, the “individual-loss” and “family-loss” materials vary from each other in multiple aspects, so the observed differences in the outcomes may not be solely attributed to difference in the themes but a number of other factors. To minimize the effect of other factors, I have tried my best to list a number of variables such as color, layout, attractiveness of characters and overall appearance for consideration. However, these variables are by no means exhaustive. Therefore this is a

limitation of using real-world intervention material. In future studies, text only messages that are different in themes maybe considered for their easy-to-manipulate nature.

Second, in this study, the survey question on number of children is phrased as such that women who never have children in their life and women who have children but none of the children is living with them will give the same answer of “0”. Consequently, these two groups of women are considered as one category in the analyses and result interpretation. However, in future studies it may be of interest to categorize women by whether they ever have children or not regardless of whether their children are currently living with them, and examine the moderating effect of this categorical variable.

Third, participants assessed the web survey under non-lab setting. It is possible that they were not attentive to the promotion materials or the subsequent questions and therefore the assessment may not be accurate. To minimize the possibility of inattentiveness, an open-ended comprehension question was presented below the promotion material to elicit more in-depth processing and thinking.

Fourth, due to the social desirability issues, participants may want to be perceived as healthy or responsive to preventive behavior. As a result, the intention to take a mammogram was relatively high for both conditions, but in the real world it may not necessarily be the case. It is also possible that participants intend to satisfy the researcher.

Fifth, only behavioral intention, not the actual screening behavior, was assessed. Although the Theory of Planned Behavior suggests that intention is a strong predictor of behavior, there is still a gap between these two outcomes, especially considering the complexity and controversy in the context of mammogram screening whose guidelines from different organization are conflicting.

Sixth, a number of tests were run to examine the effect of the two themes, therefore there is a random chance of finding significance and the results maybe false positive. In another word, there might not have been a difference in effectiveness between both messages. However, it is not necessary a bad thing. If two messages are equally effective, that allows more options and diversity in messaging in the real world. Both themes can elicit discussions and thoughts. The family-loss theme makes women who have no children living in the family get the chance to talk about the family impact of getting breast cancer. And women who have children living in the family get the chance to think about the impact on themselves. Both are likely to amplify campaign effects.

Finally, sample recruited from MTurk may not represent the general U.S. population. Therefore, generalization of the result should be done with caution.

CHAPTER 7: CONCLUSION

This study provides suggestive data that family-loss message may be more effective than individual-loss message in promoting intention to take or talk about mammogram. It provides evidence that family-loss message can evoke more sadness emotion than individual-loss message in women. Among women who do not live with any children (either because they have no children or because their children do not live with them) the family-loss message significantly increases their intention to talk about mammogram with their family members than the individual-loss message. This difference is not observed in women who live with their children. These findings may guide future design of mammogram promotion materials.

APPENDIX A: SURVEY QUESTIONNAIRE

Thank you for agreeing to participate in this study. You will be asked to view a health promotion advertisement and to complete a short survey based on what you see. Survey completion will take about 10 minutes. For proper display, please do NOT take the survey on a smartphone. Please use only a desktop/laptop computer, tablet, or iPad. Participation is voluntary. Your responses won't be linked to your name in the analysis and reporting of data. After completing the survey, you will receive your MTurk confirmation code. You will need to copy and paste the code into the MTurk HIT. If you need more information, please contact Xiaokun Qian, UNC Chapel Hill, at qians@live.unc.edu. By clicking "Next" at the lower right corner of the screen, you confirm that you:

- are female are 40-74 years old
- do NOT have breast cancer history
- live in the U.S. but outside the state of Minnesota
- have ability to read English
- are using a desktop/laptop computer, tablet, or iPad give consent to participate

After you click "Next," you confirm the above information and will be able to see the questions.

Pre-screening questions:

First, a couple of questions about you.

What is your age? Please type in a whole number.

Sex What is your gender?

- ☐ Female (1)
- ☐ Male (2)

State In what state do you currently reside?

Options: 52 states and "do not live in the U.S."

History Do you have breast cancer history?

- ☐ Yes (1)
- ☐ No (2)

Next you will see a health promotion advertisement. It consists of three images. The ad will be displayed only ONCE. Please view it carefully. Then answer the questions that follow. Please note that the graphics may take a while to load. Click "Next" to see the ad.

Condition 1/condition 2

1. Please explain in your own words what the main message of the ad is (within 200 words):

2. Looking at the ad made me FEEL...

	Not at all (1)	A little (2)	Some (3)	Quite a bit (4)	A lot (5)
sad (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
guilty (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
fearful (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
happy (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
amused (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
upbeat (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. After viewing the ad, how likely are you to talk with your family members or your healthcare provider about mammogram over the next two weeks?

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
extremely unlikely:extremely likely (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. How likely is it that you will get a mammogram done within the next two years?

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
extremely unlikely:extremely likely (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Getting a mammogram within the next two years would be...

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)
bad:good (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
unimportant:important (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Please rate the following statement:

People important to me would approve of me getting a mammogram in the next two years.

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
strong disagree:strongly agree (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Please say how much you agree or disagree with the following statements:

The message involves an individual.

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
strongly disagree:strongly agree (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. The message involves a family.

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
strongly disagree:strongly agree (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. What do you think of the ad?

	1 (1)	2 (2)	3 (3)	4 (4)	6 (6)
boring:interesting (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
unappealing:appealing (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
not likable:likable (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. How do you like the following elements of the ad?

	Dislike very much (1)	Dislike a little (2)	Neither dislike nor like (3)	Like a little (4)	Like very much (5)
color (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
layout (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
attractiveness of the character(s) (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
overall appearance of the material (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Please say how much you agree or disagree with the following statement:

I think the material is professionally designed.

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
strongly disagree:strongly agree (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Thank you for your feedback. Now a few more questions about you.

Do you consider yourself Hispanic/Latina?

- ☐ Yes (1)
- ☐ No (2)

13. What is your race? (Check all that apply.)

- ☐ White (1)
- ☐ Black or African American (2)
- ☐ American Indian or Alaska Native (4)
- ☐ Asian (8)
- ☐ Pacific Islander (9)
- ☐ Do not wish to respond (10)

14. Are you currently married?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Do not wish to respond (3)

15. How many children do you have? (CHILDREN is defined as your own children living in the family unit, INCLUDING adopted and step-children.)

Option: 0-12+

16. What is the age of your youngest child? (If you have ONE child, please type in his/her age.) Please type in a whole number. (If he/she is less than one year old, please round it to 1)

17. What is the highest grade or year of school you completed?

- ☐ Never attended school or only attended kindergarten (1)
- ☐ Grades 1 through 8 (Elementary) (2)
- ☐ Grades 9 through 11 (Some high school) (3)
- ☐ College 1 year to 3 years (Some college or technical school) (4)
- ☐ College 4 years or more (college graduate) (5)

18. What is your annual household income from all sources?

- ☐ Less than \$10,000 (1)
- ☐ \$10,001-\$15,000 (2)
- ☐ \$15,001-\$20,000 (3)
- ☐ \$20,001-\$25,000 (4)
- ☐ \$25,001-\$35,000 (5)
- ☐ \$35,001-\$50,000 (6)
- ☐ \$50,001-\$75,000 (7)
- ☐ More than \$75,000 (8)
- ☐ Do not wish to respond (9)

19. Insurance Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, government plans such as Medicare, or Indian Health Service?

- ☐ Yes (4)
- ☐ No (5)
- ☐ Don't know/Not sure (6)

20. Mammogram Have you had mammogram in the past two years?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Don't know/Not sure (3)

21. Device What device are you using to take this survey?

- ☐ Computer (1)
- ☐ iPhone (2)
- ☐ iPod Touch (3)
- ☐ Android Phone (4)
- ☐ Blackberry (5)
- ☐ iPad (6)
- ☐ Tablet (7)
- ☐ Other (please specify) (8) _____

22. These last two questions are optional. They provide a chance for you to share any thoughts with me about the survey. Is there anything you would like to say about the SUBJECT of the survey?

23. Is there anything you would like to say about the QUESTIONS in the survey?

24. Ok, that's it! If you need more information about mammogram, please visit the Centers for Disease Control and Prevention's

website http://www.cdc.gov/cancer/breast/basic_info/mammograms.htm Thank you for participating. Click "Next" to submit and to receive your MTurk confirmation code.

APPENDIX B: MECHANICAL TURK RECRUITMENT POST

Answer a short survey

We are conducting an academic study about health promotion advertisements. The survey will take about 10 minutes.

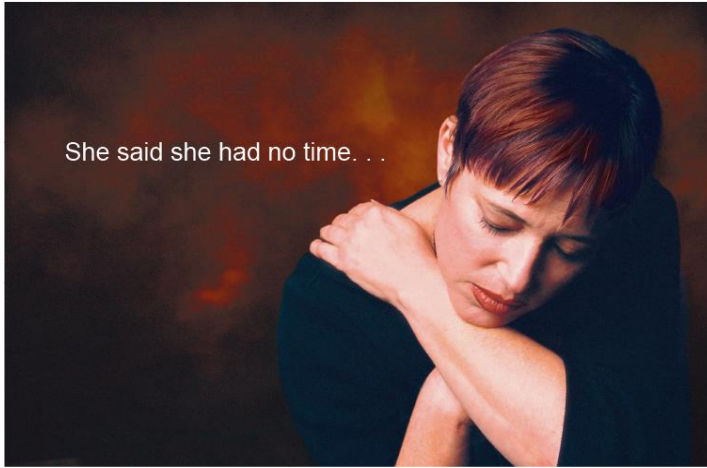
To take this survey, you must 1) be female, 2) be 40-74 years old, 3) do NOT have breast cancer history, 4) live in the U.S. but outside the state of Minnesota, 5) have ability to read English, and 6) have access to a desktop/laptop computer, tablet, or iPad. The survey should not be taken on a smartphone.

You will see a health promotion advertisement and provide your opinions on it. At the end of the survey, you will receive a code to paste into the box below to receive credit for taking the survey.

Survey link: **<http://TinyURL.com/MTurkHealthPromoAdStudy>**

APPENDIX C: INTERVENTION MATERIALS

Theme 1: Individual loss



She said she had no time. . .

...and now she has no time left.

Get a mammogram.

Don't put it off one more day!

Talk with your healthcare provider about it.
Breast cancer is cured 97% of the time when found early.

Theme 2: family loss



The Robinsons
- today -



The Robinsons
- eighteen months ago -

Get a mammogram.

Don't put it off one more day!

Talk with your healthcare provider about it.
Breast cancer is cured 97% of the time when found early.

REFERENCES

- Abood, D. A., Black, D. R., & Coster, D. C. (2005). Loss-framed minimal intervention increases mammography use. *Women's Health Issues*, 15(6), 258-264. doi:10.1016/j.whi.2005.07.005
- Abood, D. A., Coster, D. C., Mullis, A. K., & Black, D. R. (2002). Evaluation of a “loss-framed” minimal intervention to increase mammography utilization among medically un- and under-insured women. *Cancer Detection & Prevention*, 26(5), 394.
- ACOG. (2011). Annual Mammograms Now Recommended for Women Beginning at Age 40. Retrieved from http://www.acog.org/About_ACOG/News_Room/News_Releases/2011/Annual_Mammo_grams_Now_Recommended_for_Women_Beginning_at_Age_40
- ACS. (2013). Cancer Prevention & Early Detection Facts & Figures. Retrieved from <http://www.cancer.org/acs/groups/content/@epidemiologysurveillance/documents/document/acspc-037535.pdf>
- Allen, S., & Pruthi, S. (2011). The mammography controversy: When should you screen? *Journal of Family Practice*, 60(9), 524-29.
- Azjen, I., Albarracín, D., & Hornick, R. (Eds.). (2007). Prediction and change of health behavior: Applying the reasoned action approach. Mahwah, NJ: Lawrence Erlbaum Associates.
- Banks, S. M., Salovey, P., Greener, S., Rothman, A. J., Moyer, A., Beauvais, J., & Epel, E. (1995). The effects of message framing on mammography utilization. *Health Psychology*, 14(2), 178-184. doi:10.1037/0278-6133.14.2.178
- Berinsky, A. J., Huber, G. A., Lenz, G. S., & Edited by R. Michael Alvarez. (2012). Evaluating online labor markets for experimental research: Amazon.com's mechanical Turk. *Political Analysis*, doi:10.1093/pan/mpr057
- Bornstein, R. F. (1989). Exposure and affect: Overview and meta-analysis of research. *Psychological Bulletin*, 106, 265–289.
- BRFSS. (2013). 2013 Behavioral Risk Factor Surveillance System Questionnaire. Retrieved from http://www.cdc.gov/brfss/questionnaires/pdfques/2013%20BRFSS_English.pdf
- Brown, S. L., Gibney, T. M., & Tarling, R. (2013). Busy lifestyles and mammography screening: Time pressure and women's reattendance likelihood. *Psychology & Health*, 28(8), 928-938. doi:10.1080/08870446.2013.766734

- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's mechanical turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, 6(1), 3-5. doi:10.1177/1745691610393980
- CDC. (2012). Cancer Screening — United States, 2010. *Morbidity Mortality Weekly Report*, 61(3).
- CDC. (2013). *Breast Cancer Statistics*. Retrieved from <http://www.cdc.gov/cancer/breast/statistics/>
- CDC. (2013). Tips from former smokers. Retrieved from <http://www.cdc.gov/tobacco/campaign/tips/resources/videos/terrie-videos.html#terrie>
- CDC. (2014). Screen for Life. Retrieved from http://www.cdc.gov/cancer/colorectal/sfl/tv_psa.htm
- Champion, V. (1994). Relationship of Age to Mammography Compliance. *CANCER Supplement*, 74(1).
- Cox, D., & Cox, A. D. (2001). Communicating the Consequences of Early Detection: The Role of Evidence and Framing. *Journal Of Marketing*, 65(3), 91-103.
- De Coster, S., & Zito, R. (2013). Maternal roles and adolescent depression: Conditions and processes of influence. *Sociological Perspectives*, 56(1), 1-23.
- Dillard, J., & Nabi, R. L. (2006). The Persuasive Influence of Emotion in Cancer Prevention and Detection Messages. *Journal of Communication*, 56S123-S139. doi:10.1111/j.1460-2466.2006.00286.x
- Dillard, J. P., & Peck, E. (2001). Persuasion and the structure of affect. dual systems and discrete emotions as complementary models. *Human Communication Research*, 27(1) Retrieved from https://auth.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=5026004&site=ehost-live&scope=site
- Dillard, J. P., Plotnick, C. A., Godbold, L. C., Freimuth, V. S., & Edgar, T. (1996). The multiple affective consequences of AIDS PSAs: Fear appeals do more than scare people. *Communication Research*, 23, 44–72.
- Ferriman, K., Lubinski D., & Benbow C. (2009). Work preferences, life values, and personal views of top math/science graduate students and the profoundly gifted: Developmental changes and gender differences during emerging adulthood and parenthood. *Journal of Personality and Social Psychology*, 97, 517-532.
- Harway, M., & Nutt, R. L. (2006). Women and Giving. In J. Worell, C. D. Goodheart (Eds.) , *Handbook of girls' and women's psychological health*.

- Huang, M. (1997). Is negative affect in advertising general or specific? A comparison of three functional forms. *Psychology and Marketing*, 14(3), 223-240. doi:10.1002/(SICI)1520-6793(199705)14:3<223::AID-MAR2>3.0.CO;2-D
- Gender and well-being across the lifespan (pp. 200-207). New York, NY US: Oxford University Press.
- Jarvis,. (1996). The association between having children, family size and smoking cessation in adults. *Addiction*, 91(3), 427-434. doi:10.1111/j.1360-0443.1996.tb02292.x
- Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47 (2), 263-292.
- Katz, S. J., & Hofer, T. P. (1994). Socioeconomic Disparities in Preventive Care Persist Despite Universal Coverage. *JAMA*, 272(7).
- Kim, J., & Jang, S.N. (2008). Socioeconomic Disparities in Breast Cancer Screening among US Women: Trends from 2000 to 2005. *J Prev Med Public Health*, 41(3), 186–194.
- Lipkus, I. M., Ranby, K. W., Lewis, M. A., & Toll, B. (2013). Reactions to framing of cessation messages: Insights from dual-smoker couples. *Nicotine & Tobacco Research*, 15(12), 2022-2028.
- Mandelblatt, J. S., Cronin, K. A., Bailey, S., Berry, D. A., de Koning, H. J., Draisma, G., . . . , . (2009). Effects of mammography screening under different screening schedules: Model estimates of potential benefits and harms. *Annals of Internal Medicine*, 151(10), 738-747. doi:10.7326/0003-4819-151-10-200911170-00010
- MDH. (2013). Breast and Cervical Cancer Screening - Sage Program. Retrieved from <http://www.health.state.mn.us/divs/hpcd/ccs/screening/sage/>
- Meyerowitz, B. E., & Chaiken, S. (1987). The effect of message framing on breast self-examination attitudes, intentions, and behavior. *Journal of Personality and Social Psychology*, 52(3), 500-510.
- Mitchell, A.A., Olson, J.C. (1981), Are Product Attribute Beliefs the Only Mediator of Advertising Effects on Brand Attitude? *Journal of Marketing Research*, 18 (3), 318-332.
- Montano, D. E., & Taplin, S. H. (1991). A test of an expanded theory of reasoned action to predict mammography participation. *Social Science & Medicine*, 32(6), 733-741. doi:10.1016/0277-9536(91)90153-4
- O'Keefe, D. J., & Jensen, J. D. (2009). The Relative Persuasiveness of Gain-Framed and Loss-Framed Messages for Encouraging Disease Detection Behaviors: A Meta-Analytic Review. *Journal of Communication*, 59(2), 296-316.

- Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running experiments on amazon mechanical turk. *Judgment and Decision Making*, 5(5), 411-419. doi:<http://journal.sjdm.org>
- Perrone, K. M., Wright, S. L., & Jackson, Z. (2009). Traditional and Nontraditional Gender Roles and Work-Family Interface for Men and Women. *Journal of Career Development*, 36(1), 8-24.
- Pew. (2013). Modern Parenthood - Roles of Moms and Dads Converge as They Balance Work and Family. Retrieved from http://www.pewsocialtrends.org/files/2013/03/FINAL_modern_parenthood_03-2013.pdf
- Rauscher, G. H., Allgood, K. L., Whitman, S., & Conant, E. (2012). Disparities in Screening Mammography Services by Race/Ethnicity and Health Insurance. *Journal of Women's Health* (15409996), 21(2), 154-160. doi:10.1089/jwh.2010.2415
- Rhoads, S. E., & Rhoads, C. H. (2012). Gender roles and infant/toddler care: Male and female professors on the tenure track. *Journal Of Social, Evolutionary, And Cultural Psychology*, 6(1), 13-31. doi:10.1037/h0099227
- Rothman, A. J., Salovey, P., Antone, C., Keough, K., & Martin, C. D. (1993). The influence of message framing on intentions to perform health behaviors. *Journal of Experimental Social Psychology*, 29(5), 408-433. Retrieved from https://auth.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=1994-10977-001&site=ehost-live&scope=site
- Salovey, P., & Williams-Piehota, P. (2004). Field Experiments in Social Psychology. *American Behavioral Scientist*, 47(5), 488-505. doi:10.1177/0002764203259293
- Schneider, T. R., Salovey, P., Apanovitch, A., Pizarro, J., McCarthy, D., Zullo, J., & Rothman, A. J. (2001). The effects of message framing and ethnic targeting on mammography use among low-income women. *Health Psychology*, 20(4), 256-266. doi:10.1037/0278-6133.20.4.256
- Southwell, B. G., & Yzer, M. C. (2007). The roles of interpersonal communication in mass media campaigns. In C. Beck (Ed.), *Communication yearbook 31* (pp. 420–462). New York: Lawrence Erlbaum.
- Stimpson, J., Wilson, F., & Reyes-Ortiz, C. (2009). Influence of number of children on cancer screening among adults in the United States. *Journal Of Medical Screening*, 16(4), 170-173. doi:10.1258/jms.2009.009056
- U.S. Preventive Services Task Force. (2009). Screening for Breast Cancer. Retrieved from <http://www.uspreventiveservicestaskforce.org/uspstf/uspsbrca.htm>
- Van Honk, J., Schutter, D., Bos, P., Kruijt, A., Lentjes, E., & Baron-Cohen, S. (2011). Testosterone administration impairs cognitive empathy in women depending on second-

to-fourth digit ratio. *The Proceedings of the national Academy of Sciences*, 108(8), 3448-3452.