

Getting the Message Across: Age Differences in the Positive and Negative Framing of Health Care Messages

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Although valenced health care messages influence impressions, memory, and behavior (Levin, Schneider, & Gaeth, 1998) and the processing of valenced information changes with age (Carstensen & Mikels, 2005), these 2 lines of research have thus far been disconnected. This study examined impressions of, and memory for, positively and negatively framed health care messages that were presented in pamphlets to 25 older adults and 24 younger adults. Older adults relative to younger adults rated positive pamphlets more informative than negative pamphlets and remembered a higher proportion of positive to negative messages. However, older adults misremembered negative messages to be positive. These findings demonstrate the age-related positivity effect in health care messages with promise as to the persuasive nature and lingering effects of positive messages.

Keywords: goal framing, aging, positivity effect, decision making, health care messages

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People are regularly exposed to messages about their health, from media advertisements to pamphlets in physician offices. Older adults spend a larger amount of time exposed to health information compared to younger adults, as they spend more time interacting with their physicians and experience more hospital visits with extended duration (Thompson, Robinson, & Beisecker, 2004). Considering the overwhelming amount of health care information presented to older adults, one wonders the following: What information actually sticks and what makes a health care message informative and memorable?

Emotional valence plays a central role in age differences in information processing as older adults relative to younger adults demonstrate a relative shift in preference from negative to positive information (Carstensen & Mikels, 2005). In particular, older adults attend to and remember a greater proportion of positive relative to negative details in decision tasks than do young adults—some of which involve health care decisions (Löckenhoff & Carstensen, 2007; Mather, Knight, & McCaffrey, 2005). While these results importantly illustrate the interaction between valence and age in health care decision making, other methods present

health care information in either a positive or negative frame with pamphlets. Critically, differential positive and negative framing can shift people's preferences for a particular choice, even if the options are objectively equivalent (Tversky & Kahneman, 1981).

Framing can influence decision making through a variety of contexts and different types of frames (for a review, see Levin, Schneider, & Gaeth, 1998). Many health-related messages use a particular type of framing, known as goal framing, which emphasizes either receiving a health benefit by performing a particular behavior or avoiding a negative consequence by performing the same behavior. For example, a positive frame regarding skin cancer might read, "The *earlier* it is detected, the *better* the person's chances are for full recovery." Conversely, the negative frame would read, "The *later* it is detected, the *poorer* the person's chances are for full recovery." This type of frame is unique because both of these statements target the same behavior (i.e., proactive measures for early detection); however, they have opposite emotional tones. In the present study, we sought to examine goal framing in older and younger adults.

Goal framing was notably demonstrated by Meyerowitz and Chaiken (1987) in a study that examined framing influences on women's likelihood to engage in breast self-examinations. They found that female college students were more motivated to perform breast self-examinations through a negative goal frame than they were to do breast self-examinations through a positive goal frame. Other research on goal framing has shown that when health information is processed deeply, negatively framed messages have a stronger impact on behavior than do positively framed messages (Block & Keller, 1995). More conclusively, Levin, Schneider, and Gaeth (1998) reviewed numerous goal-framing studies and found that negative goal framing was more persuasive and influential than was positive goal framing. Though some studies have suggested differing results based on participant level of involvement and perception of the addressed behavior as risky (Maheswaran & Meyers-Levy, 1990; Rothman, Salovey, Antone, Keough, & Mar-

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tin, 1993), to our knowledge there have been no studies that explicitly investigated age-differences in goal framing.

Although not specifically focusing on goal framing per se, Lockwood, Chasteen, and Wong (2005) looked at the influence of health-related positive and negative role models across age groups, taking into consideration relative prevention–promotion focus. Younger adults perceived positive role models to be more motivating (attributed to promotion focus), whereas older adults perceived both positive and negative role models as motivating (attributed to promotion and prevention focus). While these researchers did examine the influence of valence across age groups in a health-related context, the focus was more on prevention–promotion influences as opposed to a measure of attitudes and memory for simple health care information. Their study did not employ pure framing; thus, it is still unclear how health-related goal framing would vary across age groups.

Nonetheless, there has been some research examining age differences in risky-choice framing, albeit with mixed results. Two studies found minimal age differences in the framing of hypothetical decisions (Mayhorn, Fisk, & Whittle, 2002; Rönnlund, Karlsson, Lagnäs, Larsson, & Lindström, 2005), whereas another study found that older adults showed increased framing and reliance on heuristic processing compared to younger adults for similar decisions (Kim, Goldstein, Hasher, & Zacks, 2005). Another study, though, found that older and younger adults demonstrated equivalent framing in a positive gain frame, but that older adults were less risk seeking in a negative loss frame than were younger adults (Mikels & Reed, 2009). Collectively these risky-choice framing studies present equivocal results. However, a crucial and common thread between all four studies is that they focus only on risky-choice framing, whereby options are displayed as essentially equal in expected value but presented in a positive or negative way via the manipulation of probabilities and gain–loss labels. Unlike the probabilistic decisions inherent in risky-choice framing tasks, goal-framing paradigms involve certain outcomes that result from either committing or failing to commit a given behavior in the gain or loss frame, respectively. Thus, the major difference between these two types of framing lies in presenting the behavior–consequence link (goal framing) versus presenting risk level (risky-choice framing).

Given the fundamental difference between these approaches to framing, it is not clear whether the findings from aging studies of risky choice will generalize to aging studies of goal framing. For instance, it is quite plausible that messages relating to individuals' health and personal consequences would prompt stronger emotional responses than would hypothetical and not personally relevant decisions. Socioemotional selectivity theory proposes that the salience of emotional information varies with increasing age, such that as people age they are more motivated to pursue emotionally meaningful goals (Carstensen, Isaacowitz, & Charles, 1999). Information valence is also important to consider, as an emerging body of research supports an age-related *positivity effect*: a developmental pattern in which a disproportionate preference for negative information in youth shifts toward a disproportionate preference for positive information in later life (Carstensen & Mikels, 2005). For instance, Charles, Mather, and Carstensen (2003) found that while there was an overall decrease in image recall with age, the ratio of positive to negative images recalled increased with age. Moreover, the positivity effect has been demonstrated in working

memory (Mikels, Larkin, Reuter-Lorenz, & Carstensen, 2005) and autobiographical memory (Kennedy, Mather, & Carstensen, 2004). Despite evidence supporting the positivity effect in various forms of memory, there are also findings that do not support the positivity effect—but these results may be due to task instructions (see Carstensen, Mikels, & Mather, 2006, for a discussion). Lastly, additional research indicated that older adults falsely remembered more positive than negative information in three different recall tasks, which suggests that older adults may reconstruct their memories to emphasize the positive (Fernandes, Ross, Wiegand, & Schryer, 2008).

The current study examined how framing health information in positive versus negative ways may lead to age differences in impressions and memory. Based on the previous literature on goal framing and the positivity effect, we had two hypotheses. First, we predicted that older adults would be more influenced, relative to younger adults, in their impressions and intentions to perform prevention–detection behaviors regarding health issues from a positive frame than from a negative frame. Second, we predicted that older adults would better remember positively versus negatively framed messages. We expected this effect to manifest itself in a higher proportion of positive to negative statements remembered for older versus younger adults.

Method

Participants

Twenty-five older adults ranging from 64 to 86 years of age ($M = 74.48$ years, $SD = 5.93$ years; 16 women) and 24 younger adults ranging from 18 to 23 years of age ($M = 20.38$ years, $SD = 1.25$ years; 13 women) participated in this experiment. Older adults were recruited from the Ithaca, New York, community and were monetarily compensated. Younger adults were recruited from the university community and were compensated with course credit. Participant characteristics were normative for the older and younger age groups (see Table 1).

Materials

Participants read four pamphlets that provided information about different health care issues. Although realistically most health issues are more significant for older adults, we chose health issues that would be important to both older and younger adults: influenza, cholesterol, skin cancer, and sexually transmitted diseases. The pamphlets were designed to mimic a pamphlet that might be found in a physician's office, and included general information about a particular health domain gathered from the Centers for Disease Control and Prevention online health database (Centers for Disease Control and Prevention, 2007, 2008a, 2008b, 2008c). In addition, each pamphlet contained four goal-framed statements that referred to actions or behaviors a person could perform regarding his or her personal health, modeled after Meyerowitz and Chaiken (1987). These statements were manipulated to create two pamphlets for each health domain, one including four positively framed statements and one including four negatively framed statements (see online supplemental materials for pamphlet example). Pamphlets within each domain contained identical information from the Centers for Disease Control and Prevention

Table 1
Mean Scores on Demographic Variables for Younger and Older Adults

Variable	Younger		Older		<i>t</i> (47)	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Age	20.38	1.25	74.48	5.93	44.53	<.001
Education	15.04	0.99	15.48	2.28	0.66	.39
Digit Symbol (max. score = 133)	82.00	19.02	61.44	22.22	-3.39	.001
Digit Span—Total (max. score = 30)	19.00	3.56	17.56	4.33	-1.26	.21
Vocabulary (max. score = 66)	51.35	8.81	48.57	10.50	-0.97 ^a	.34

Note. Digit Symbol, Digit Span—Total, and Vocabulary come from the Wechsler Adult Intelligence Scale (3rd ed.; Wechsler, 1997).

^a *df* = 44.

database, and the only variation between pamphlets were the four framed statements.

Procedure

All experimental instructions were presented on a desktop computer screen via E-Prime Experimental Software. Participants were randomly assigned to read two positive and two negative pamphlets. Participants were given an unlimited amount of time to read each pamphlet, one at a time, after which they rated the pamphlet on a series of questions. These questions were modeled after the postexperimental questions used in previous goal-framing health care studies (Block & Keller, 1995; Meyerowitz & Chaiken, 1987; Rothman et al., 1993) and gauged participants' impressions and intended health behaviors regarding each health issue (see the Appendix for the specific questions). Participants responded to each question using a 7-point Likert-type scale, and completed the ratings process for all four pamphlets.

After reading and rating the pamphlets, participants completed a surprise recognition task for the 16 framed statements they had viewed (four statements from each of four domain-specific pamphlets). Participants viewed 16 pairs of statements, each pair containing the statement that they saw in the pamphlet they read, while the other statement was informationally equivalent but oppositely valenced. All 16 statement pairs were presented in random order for each participant, and the relative position of positive and negative statements was counterbalanced such that half of the pairs presented the positive frame first and half of the pairs presented the

negative frame first. For example, one memory recognition trial presented these statements:

Research shows that people who regularly check their cholesterol levels have an increased chance of recognizing their risks for other related health issues. [positive frame]

Research shows that people who do not regularly check their cholesterol levels have a decreased chance of recognizing their risks for other related health issues. [negative frame]

Upon reading each pair of statements, participants were asked to identify which statement they previously read in the pamphlet. This process continued for the remaining statement pairs.

Results

Pamphlet Ratings

The five postpamphlet questions conceptually measured different constructs regarding impressions toward the health issue and intended behaviors as the reliability between these ratings was low (Cronbach's $\alpha = .61$). Therefore, we conducted our analyses on each individual question. Preliminary analyses revealed no effects of pamphlet order. Thus, in the following analyses, we assume no order effects or effects from participant fatigue. The data were analyzed in a mixed-model analysis of variance.

As illustrated in Tables 2 and 3, there was a main effect of age for three of the five postpamphlet questions. Relative to younger

Table 2
Mean Scores on Postpamphlet Questions for Older and Younger Adults

Question	Younger						Older					
	Positive frame		Negative frame		Total		Positive frame		Negative frame		Total	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Question 1: Seriousness	5.30	0.23	5.07	0.23	5.19	0.21	5.99	0.23	6.29	0.23	6.14	0.20
Question 2: Contraction likelihood	3.76	0.22	3.58	0.22	3.67	0.17	3.60	0.22	3.58	0.22	3.59	0.17
Question 3: Prevention likelihood	4.13	0.30	4.83	0.30	4.48	0.25	5.71	0.29	5.80	0.29	5.75	0.24
Question 4: Detection likelihood	4.41	0.28	4.19	0.28	4.30	0.23	4.77	0.27	5.02	0.27	4.89	0.22
Question 5: Informativeness	4.28	0.30	4.27	0.30	4.28	0.29	6.01	0.29	5.34	0.29	5.68	0.28

Table 3
Statistical Results From Analyses of the Postpamphlet Questions

Question	Main effects		
	Age	Valence	Age \times Valence interaction
Question 1: Seriousness	$F(1, 45) = 10.61, p < .05$	$F(1, 135) = 0.06, p = .80$	$F(1, 135) = 3.36, p = .07$
Question 2: Contraction likelihood	$F(1, 45) = 0.12, p = .74$	$F(1, 135) = 0.27, p = .61$	$F(1, 135) = 0.18, p = .67$
Question 3: Prevention likelihood	$F(1, 45) = 13.51, p = .001$	$F(1, 135) = 2.96, p = .09$	$F(1, 135) = 1.82, p = .18$
Question 4: Detection likelihood	$F(1, 45) = 3.41, p = .07$	$F(1, 135) = 0.01, p = .93$	$F(1, 135) = 1.14, p = .29$
Question 5: Informativeness	$F(1, 45) = 12.38, p < .05$	$F(1, 135) = 8.60, p < .05$	$F(1, 135) = 7.83, p < .05$

adults, older adults reported that the health issues were more serious, stated that they were more likely to practice preventative behaviors, and regarded the pamphlets as more informative. Moreover, there was a main effect of pamphlet valence on ratings of informativeness, such that positive pamphlets were rated as more informative than were negative pamphlets. However, this effect was qualified by an interaction between age and valence, such that older adults reported that positive pamphlets were more informative than were negative pamphlets, while younger adults did not differ in their ratings of positive and negative pamphlets. There was also a significant three-way interaction between age, valence, and domain for ratings of informativeness. Independent samples t tests indicated that older adults demonstrated framing for the cholesterol pamphlets, whereas younger adults demonstrated framing for the sexually transmitted diseases pamphlets ($t_s > 1.94$, $p_s < .05$, one-tailed; see online supplemental materials). Thus, the domains for which framing effects were observed differed by age. No other main effects or interactions emerged as significant.

Recognition Performance

Given our focused prediction of a positivity effect as derived from socioemotional selectivity theory, we calculated a positivity index to assess participants' relative preferences for positive and

negative information (e.g., Löckenhoff & Carstensen, 2007). We first examined memory as a proportion of positive to negative messages remembered and found that older adults did indeed remember a higher proportion of positive to negative messages ($M = .50$, $SD = .30$) relative to younger adults ($M = .28$, $SD = .34$), $t(47) = -2.41$, $p < .05$. However, to unpack this finding, we employed a generalized estimating equation, which is appropriate for analyzing clustered data with binary outcomes, while simultaneously generating accurate standard errors. Responses were coded for accuracy (0 = incorrect, 1 = correct) based on whether participants chose the correct statement from the particular pamphlet they read. We also analyzed accuracy via a series of one-sample t tests using the test value of 0.5 so as to determine accuracy levels that were significantly different from chance (50% accuracy).

Overall accuracy did not differ between younger adults ($M = .64$, $SD = .03$) and older adults ($M = .58$, $SD = .03$), $\chi^2(1, N = 784) = 1.75$, ns . Positive statements were more accurately recognized ($M = .80$, $SD = .02$) than were negative statements ($M = .41$, $SD = .03$) for all participants, $\chi^2(1, N = 784) = 29.29$, $p < .001$. However, as expected, there was a significant interaction between age and valence for accuracy of statement recognition, $\chi^2(1, N = 784) = 4.61$, $p < .05$ (see Figure 1). Younger adults

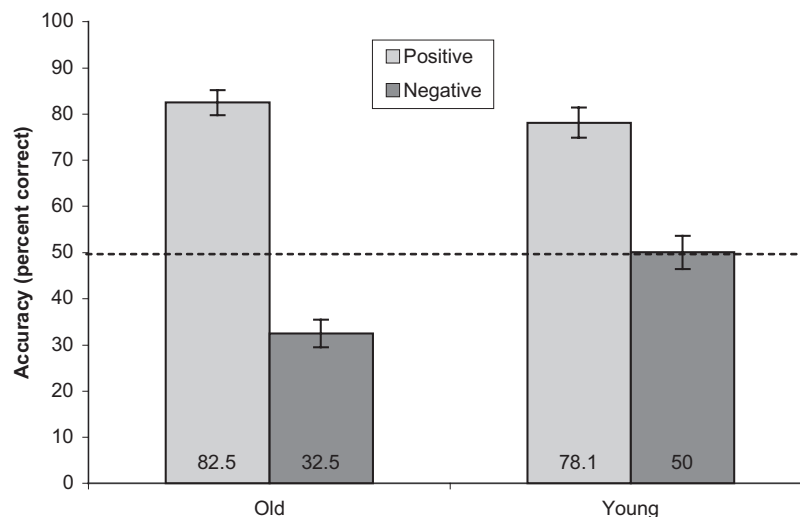


Figure 1. Accuracy on the memory recognition task by age and valence. The dashed line represents an accuracy rate at chance level. Error bars represent ± 1 SE.

more accurately recognized positive statements than negative statements, and while their accuracy for recognizing positive statements was significantly higher than chance, $t(191) = 9.40, p < .001$, their recognition of negative statements was at chance levels, $t(191) = 0.00, ns$. Older adults also recognized positive statements at above-chance levels, $t(199) = 12.07, p < .001$, but were significantly below chance at recognizing negative statements, $t(199) = -5.27, p < .001$. This result suggests that older adults misremembered the negative messages as positive.

Discussion

Our hypotheses were grounded in socioemotional selectivity theory and the positivity effect, both of which suggest that older versus younger adults would be more influenced by positively versus negatively framed messages in personally salient health care domains. These hypotheses were supported in that the positively framed pamphlets were rated as more informative by older versus younger adults, and the valenced messages were remembered as more positive by the older adults.

With respect to memory, older adults' accuracy rates for positive versus negative statements were significantly higher and lower than chance, respectively. This result suggests that older adults may misremember the valence of health care messages. Crucially, older adults had similar accuracy rates to the younger adults for the positive statements, but were significantly less accurate in recognizing negative statements. However, it should be noted that, although younger adults were relatively more accurate than were older adults for negative statements, they were still not accurate per se, as they were at chance levels of recognition. This interesting finding provides nuanced support for the positivity effect. As has been noted, the positivity effect is reflected in the ratio of positive to negative information recalled between older and younger adults (see, e.g., Charles et al., 2003). In our study, the ratio of positive to negative messages recognized increased with age; however, this age difference was driven by increased misremembering of negative messages as positive. These findings, when considered in light of the aforementioned age differences in the immediate impact of framed health care messages, highlight the importance of evaluating not only the immediate effect of the presented information but also the lasting impact of this information. Therefore, these results raise the possibility that memory for health care information may play a distinct role from immediate impressions of the information when handling decision making.

One alternative explanation for our findings with respect to age-related changes in memory for valenced health care messages is that the positive statements had simpler syntax and sentence structure. To maintain consistency with the goal-framing paradigm developed by Meyerowitz and Chaiken (1987), we structured the sentences so that the positive and negative statements would be as similar to each other as possible. While this allowed us to establish procedural control between the two conditions and vary only the emotional tone, the statements did not have particularly succinct grammatical structures. It is possible that older adults were more likely than younger adults to "misremember" negative statements as positive because they preferred simpler syntactical statements over complex ones. To eliminate this potential confound, future research could incorporate a free-recall task.

Although Meyerowitz and Chaiken (1987) observed that negatively framed messages had greater impact for younger adults, we found a bias toward positive messages in our younger adult sample. However, this contrast may reflect systematic differences in the methodologies of the two studies. For instance, although we modeled our design after Meyerowitz and Chaiken, due to our age-group comparisons, we chose four different health care domains relative to their one health care domain of breast cancer. Our health domains may have had an overall diminished impact since each health issue did not hold the same direct consequences for each participant as did breast cancer with the participants in Meyerowitz and Chaiken's study. Moreover, our results are not entirely consistent with Lockwood et al.'s (2005) study, in which they found an increasing effect of negative role models for older adults. Conversely, our study found the positive frame more influential for memory of health information. Both of these studies examine phenomena in related contexts; however, the Lockwood et al. research was rooted in a promotion-prevention framework, whereas our construct focused on valence in goal framing of health-related messages. Future studies are necessary to elucidate how this prevention-promotion focus may interface with goal framing.

A major strength to this study is its high ecological validity, as the pamphlets themselves were designed to mimic pamphlets found in a physician's office and contained information from a national health database, the Centers for Disease Control and Prevention. Additionally, most previous studies of the positivity effect have used relatively simple stimuli such as emotional pictures (Charles et al., 2003; Mikels et al., 2005) or faces (Mather & Carstensen, 2005). By contrast, the present experiment tested the positivity effect using pamphlets and valenced health care messages, a realistic and practical medium that can be easily translated into real-world interventions. However, the design of the present study restricts our ability to draw conclusions with respect to the long-term influence of health care information on subsequent behavior and decision making. Future studies would benefit from a longitudinal design that examines actual behavior. For example, an important future direction would be to observe whether positive goal frames better promote health-related behaviors, such as wearing sunscreen, between older versus younger adults.

This report presents new data on how older and younger adults differ in their processing of health care information. Our results demonstrate that valence plays a critical role in the evaluation of informative value and the type of information that older adults remember. Our research, taken in consideration with previous studies (Lockwood et al., 2005), suggests that the influence of message valence may depend on both the age of the individual and whether the message is assessed in an immediate versus delayed manner. Perhaps the most effective way to present health information with a longer lasting impact for older adults is through positive messages emphasizing the benefits gained by certain health behaviors. Applying these findings to broader health contexts, including patient-physician communication, the patient-physician relationship, and other aspects of patient-centered medicine (Stewart et al., 2003), will be crucial to enhancing the efficacy of health care communications, especially in light of the increasing aging population. It is critical to better understand how older adults view and process health care information so that

researchers can optimally provide them with information to make important health-related decisions.

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Appendix

Postpamphlet Questions

Question 1: Do you think influenza is a serious health problem?
[Seriousness]

Question 2: What do you think is your likelihood of contracting influenza?
[Vulnerability]

Question 3: How likely are you to get the influenza vaccine and practice preventative behaviors?
[Preventative behaviors]

Question 4: How likely are you to see your doctor if you notice symptoms of influenza?
[Detection behaviors]

Question 5: How informative was this pamphlet?
[Informativeness]

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