

Effects of Self-Efficacy and Vividness on the Persuasiveness of Health Communications

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We use the literature on self-efficacy and vividness to predict and explain the conditions under which vivid information will be more persuasive than nonvivid information in a health communication. Our results on sexually transmitted diseases (Experiment 1) and skin cancer (Experiment 2) demonstrate higher preferences for vivid over nonvivid material when participants believe they can follow the recommendations in the message (high self-efficacy). This vividness effect disappears under low self-efficacy. In addition, vivid information was considered more persuasive among high rather than low self-efficacy participants. The pattern of thoughts about the recommendations and consequences contained in the message provides insight on the process underlying the self-efficacy by vividness interaction.

Finding ways to deter harmful health-related behavior has become a national priority. Designing more effective health communications is widely regarded as one of the major means to attain this goal. Yet there is very little research in marketing that focuses specifically on enhancing the persuasiveness of health communications. Research that directly tests health communications is necessary because variables that have been shown to moderate advertising effects are different in health contexts (Keller & Block, 1996). One reason for these differences is that

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the persuasiveness of health messages depends on changing more complicated behaviors as compared to ads that endorse consumer products. Accordingly, it may be inappropriate to assume that message effects found in nonhealth contexts will readily apply to health communications.

One message factor finding that has widespread appeal among health practitioners is the vividness effect. The vividness effect is said to occur when material in the form of pictures, specific examples, or TV presentations is more persuasive than text-only messages, abstract arguments, or print presentations (see Kisieliuss & Sternthal, 1986; Taylor & Thompson, 1982). However, vividness manipulations have had mixed success in actual applications. Some public service communications designed to deter harmful health-related behaviors have successfully relied on vivid images for inducing attitudinal and behavioral changes. For example, a recent televised appeal encouraged men to ask their doctors about colon cancer. The commercial contained vivid images of a gravesite, a hearse, and a hospital, and then it cut to a woman reading a newspaper and telling her husband, "Dan, it says colon cancer is 90% curable if treated early." "Honey," he responds, "I have more important things to worry about right now." This single commercial, aired over a period of 1 year, more than doubled the number of inquiries about colon cancer in a four test-market (10,000 households) area (Rothenberg, 1991). However, a review of other health messages indicates that the vivid images are not persuading target audiences. For example, a message containing a vivid image of teenagers in body bags was ineffective in discouraging drug usage (Rothenberg, 1991).

These mixed findings suggest the need to identify when the vividness effect will occur in health contexts. A series of studies by Rook (1986, 1987) shed some light on this issue. In the only studies of vividness in a health context, Rook found that a vivid message on osteoporosis was more persuasive than a nonvivid message for younger rather than older women; among the older women, vivid and nonvivid information were equally persuasive. Rook (1987) explained her results by suggesting that perceived vulnerability moderates the effects of vividness on persuasion. She concluded that because older women are more vulnerable to osteoporosis than younger women, the vividness effect occurs only under conditions of low vulnerability.

Although Rook's studies provide a promising start for examining the health-related factors that may moderate the vividness effect, the level of vulnerability explanation appears unviable because perceptions of vulnerability did not differ between the older and the younger women (Rook, 1986). Therefore, we propose that the disparate vividness effects may be alternatively explained by different levels of self-efficacy between these two groups. Specifically, it is likely that the younger women believed they could more successfully change their diet and exercise routines and prevent osteoporosis than did the older women. Because perceived self-efficacy determines intentions to change health behavior (Bandura, 1977, 1982), we believe that self-efficacy may be an important moderator of

vividness effects in health contexts and can account for Rook's inconsistent findings.

We have three objectives in this article. First, we highlight the importance of studying how interactions between traditional message variables (such as vividness) and health-related moderators (such as self-efficacy) may enhance the effectiveness of health communications. Second, we provide insight on the relation between vividness and health message-related thoughts (the consequences of engaging in the harmful behavior and the recommended action steps to change the behavior). And third, we provide a more compelling explanation than currently available (Rook, 1987) for vividness effects in health contexts.

CONCEPTUAL BACKGROUND AND PRIOR RESEARCH

Vividness in Health Communications

By definition, vivid information attracts and holds people's attention (Nisbett & Ross, 1980). There are several reasons why vivid information may be more attention-getting: It may be more imageable (McGill & Anand, 1989), more emotional (MacInnis & Price, 1987), or more "intense" than nonvivid information (MacKenzie, 1986). Vivid information is used in communications because it attracts more attention than nonvivid information, thereby increasing the perceived importance of the information (MacKenzie, 1986).

However, past studies on the persuasiveness of vivid information are inconclusive. Some studies find that vivid material is better recalled (Bower, 1970; Lutz & Lutz, 1978), but many others find no differences (Taylor & Thompson, 1982). Also, vivid information does not always have disproportional influence on judgments. Studies provide inconsistent results, with some finding that vividness enhances persuasion (Reyes, Thompson, & Bower, 1980; Shedler & Manis, 1986), some finding that the distracting properties of vividness undermine persuasion (Frey & Eagly, 1993), and still others finding no differential effect on judgment (Borgida, 1979; Edell & Staelin, 1983; Wright & Rip, 1980).

These mixed findings suggest that the vividness effect may occur only under a narrow set of circumstances. Based on a review of extant studies, Taylor and Thompson (1982) and Taylor and Wood (1983) suggested conditions that might produce the vividness effect. Vivid information may be disproportionately influential when (a) the message recipient has prior attitudes about the topic; (b) the vivid information competes with less vivid information for attention; (c) inferences depend on other judgments about the message, like source credibility; (d) the message is personally relevant to the recipient; and (e) the vivid information produces an affective response or is emotionally arousing.

Following suggestions that the vividness effect occurs when the message is personally relevant and produces an affective response (Taylor & Thompson, 1982; Taylor & Wood, 1983), Rook (1986, 1987) designed a series of three experiments to test explicitly whether vivid health messages are more persuasive than nonvivid health messages. In all three studies, Rook chose a health context relevant to the target group—women and osteoporosis, which is a degenerative bone disease with particularly serious physical and emotional consequences for postmenopausal women—and manipulated vividness through case versus abstract information. Rook (1987) hypothesized that vividly presented case stories would be more persuasive than nonvivid abstract information. All three studies measured persuasiveness in terms of how worthwhile the information and recommendations were, how likely the respondents would be in following the recommendations, and how interested they would be in receiving more information about the health threat.

In one of these studies, Rook (1987) presented women who ranged in age from 34 to 70 years ($M = 48.4$ years) with information on the prevalence and risk factors of osteoporosis and recommendations to prevent it (brisk exercise and calcium intake). The abstract scenario described women in general, and the case version referred to a specific woman. Results indicated that the case information was more persuasive than the abstract information ($p < .05$). However, in a virtually identical study, Rook found that the vivid and nonvivid information were equally persuasive ($p > .10$; Rook, 1987). In this study, the women ranged in age from 55 to 79 years ($M = 71.3$ years) and thus were significantly older than those in the previous study. Because older women are more vulnerable to osteoporosis than younger women, Rook suggested that vivid information is more persuasive than nonvivid information only under conditions of low perceived vulnerability.

Rook (1986) tested this hypothesis in yet another study in which she compared two groups: women for whom osteoporosis was a more distant threat (ages 35–45) and women for whom osteoporosis was a more proximal threat (ages 55 and older). Again, she found that the vivid case information was more persuasive than the nonvivid abstract information for the younger women but that vivid and nonvivid information were equally persuasive for the older women. Unfortunately, contrary to Rook's expectations, the younger and older groups did not differ in their levels of perceived vulnerability to osteoporosis. These inconsistent results signal that some perceptual factor that varies with age, other than perceived vulnerability, moderates the vividness effect.

We propose that perceived efficacy offers a compelling explanation. The literature on health-related communications suggest that message compliance is primarily determined by the message recipient's perception of whether following the recommendations is an efficacious way to reduce the threat (see Eagly & Chaiken, 1993). There are two components of perceived efficacy: Response efficacy refers to the person's belief that the recommended behaviors are effective in reducing or eliminating the danger, whereas personal or self-efficacy refers to the person's

belief that he or she has the ability to perform the recommended behaviors. Often, a person's perception of self-efficacy dominates. For example, doctors recommend that women perform monthly breast self-examinations to detect abnormalities (high response efficacy). However, the woman must believe that she can do the examination correctly and determine a problem (high self-efficacy); if the woman doubts her ability to do a self-examination (low self-efficacy), compliance will be low. We suggest that perceptions of self-efficacy moderate the vividness effect, and we discuss our rationale next.

Self-Efficacy and the Vividness Effect

Self-efficacy theory maintains that psychological change processes operate through the modification of people's expectancies of personal efficacy or their ability to master the problem (Bandura, 1977, 1982; Maddux & Rogers, 1983). Perceptions of self-efficacy influence whether coping behavior is initiated, how much effort is extended, and how long the behavior is sustained (Bandura, 1977). Because misjudgments of self-efficacy can produce adverse consequences, accurate appraisal of one's abilities is important in determining thought patterns, emotional reactions, and behavioral intentions (Bandura, 1982).

We suggest that varying perceptions of self-efficacy can account for the results that Rook obtained in the three studies. Although the older women were objectively at greater risk of getting the disease, changing long-standing personal habits such as diet and exercise is extremely difficult (Kirscht & Rosenstock, 1979). It is reasonable to assume that for the older groups of women in Rook's studies ($M = 71$ and 60 years of age, respectively) perceptions of self-efficacy were low. That is, these women may have had low confidence in their ability to change lifetime dietary and exercise habits and prevent osteoporosis. By contrast, it is reasonable to assume the younger women ($M = 48$ and 39 years of age, respectively) may have had higher perceived self-efficacy. Although the threat of osteoporosis is relevant, their chances are good that a change in diet or exercise can prevent occurrence of the disease (Avioli, 1983).

These varying perceptions of self-efficacy can account for the persuasive effects of vivid information being restricted to the younger age group. As suggested by self-efficacy theory, individuals are likely to consider a change in behavior only when their perceived likelihood of success in carrying out the recommendations is high (high self-efficacy). Only individuals with higher levels of perceived self-efficacy will be motivated to elaborate on the health message. Thus, self-efficacy theory and vividness theory would predict that the increased persuasiveness of vivid over nonvivid information will occur only under conditions of high perceived self-efficacy.

An early study (Rogers & Mewborn, 1976) supports our proposition that the vividness effect will only occur under conditions of high self-efficacy. These

authors tested two levels of perceived efficacy and two levels of a variable they called noxiousness. The low-noxiousness film demonstrated the laboratory procedures for performing a serum test for venereal disease without showing the diseased tissue. The high-noxiousness film showed the diseased tissue being surgically removed. Notwithstanding content differences, the noxiousness manipulation is similar to vividness in that the high-noxiousness film was emotionally more arousing. Only in the high-efficacy condition was the high-noxiousness film more persuasive than the low-noxiousness film ($p < .02$). The two films were equally persuasive in the low-efficacy condition. Thus, this study also implicates perceived efficacy as a moderator of the persuasiveness of vivid information.

In summary, the studies by Rook (1986, 1987) and Rogers and Mewborn (1976) suggested an interaction effect of vivid information and perceived efficacy. Accordingly, we propose that at higher levels of self-efficacy, vivid information will be more persuasive than nonvivid information, but at lower levels of self-efficacy, vivid and nonvivid information will be equally persuasive. We explicitly test this hypothesis in two experiments in health-related contexts. The messages focus on sexually transmitted disease and skin cancer, respectively; both are diseases that are increasing in occurrence and are highly relevant to a student population (American College Health Association, 1990; Miller, Ashton, McHoskey, & Gimbel, 1990; Goldsmith, 1987). These experiments are presented next.

EXPERIMENT 1

Procedure

One hundred ninety-seven undergraduate students received human papilloma virus (HPV) pamphlets that were designed to mimic those distributed by the American College Health Association (1990). Each student received a color foldout four-page pamphlet called *HPV ... WHAT'S THAT?* (see Appendix A). Page 1 provided information about HPV's definition (e.g., "HPV stands for human papilloma virus, a family of at least 60 viruses, about one-third of which cause genital problems that affect both males and females.") and its associated consequences. Pages 2 and 3 contained recommendations for the prevention of HPV (e.g., practice safe sex), and the last page presented a likely reaction scenario to finding out one has HPV (see Appendix A).

Prior to receiving the HPV pamphlets, participants were given a pretest questionnaire to measure their prior knowledge of HPV (Meyerowitz & Chaiken, 1987). This questionnaire asked them to rate on a scale of 1 (*very little*) to 7 (*a great deal*) how much they know about HPV and on a scale of 1 (*disagree*) to 7 (*agree*) whether they know a lot about HPV, whether they know more than most about HPV, and whether they are very familiar with ways to prevent HPV. They were then given

an open-ended task with the instructions to "Imagine that you are telling a friend what HPV is, how you can prevent it, and how it can be cured. What would you tell this friend?" These measures were included to explore the possibility that the vividness manipulation or self-efficacy measure might interact with individual differences on prior knowledge and familiarity. These individual difference measures did not interact with vividness or self-efficacy to affect persuasion and are not discussed further.

After completion of the prior knowledge measures, participants were presented with the cover sheet, the HPV pamphlet, and a second questionnaire that queried them on persuasion measures and manipulation checks. Upon completion, participants were thanked and debriefed.

Experimental Measures

Vividness. Vividness was manipulated by presenting either personal case stories or abstract impersonal information. As in Rook's (1987) manipulation, one half of the participants received an anecdotal story that describes a fictitious couple's reaction upon learning they have HPV. These stories about Linda and Jeff were taken from actual HPV pamphlets targeted at college students (American College Health Association, 1990). In the nonvivid version, the stories were depersonalized by replacing summary abstract information for the personalized anecdotes. The vivid and nonvivid versions were matched as closely as possible for content and length. Below is an example of each version; see Figure A.1 in Appendix A for the complete text.

Vivid (personal):

As soon as I got back to my dorm, I called my best friend, Liz. I was feeling pretty anxious and sort of panicky. How was I going to tell my boyfriend, Jeff? Initially I was frightened about telling him anything, but I knew that I would want to know if the situation were reversed.

Nonvivid (impersonal):

A large percentage of women told us they felt anxious and panicky and needed to confide to a close woman friend. Most women are afraid to tell their boyfriends, but they realize they would want to know if the situation were reversed.

An 11-item semantic differential scale based on prior research was used to measure the vividness of the personal versus impersonal information (Dickson, 1982; Kisielius & Sternthal, 1984; McGill & Anand, 1989; Nisbett & Ross, 1980; Rook, 1987; Taylor & Thompson, 1982). The items were: not vivid/vivid, not personal/personal, not easy to understand/easy to understand, not specific/specific, not representative/representative, not concrete/concrete, not easy to imagine/easy

to imagine, not easy to relate to/easy to relate to, not important/important, not detailed/detailed, and not easy to picture/easy to picture. These items were averaged to provide a vividness scale ($\alpha = .91$) that was used to confirm that participants perceived the personal information to be more vivid than the impersonal information ($M = 5.35$ vs. $M = 4.48$), $F(1, 192) = 34.28, p < .001$.

Response efficacy. Low- versus high-response efficacy was manipulated by varying the level with which adherence to the recommendations will lead to the desired outcome. The low- (high-) efficacy condition reported that "Clinical studies show that following the recommendations will reduce your risk of contracting HPV by TWENTY (EIGHTY) PERCENT." A two-item, 7-point scale, "Following the recommendations in this pamphlet is risky because I may not be able to prevent HPV even if I did them" and "Following the prevention recommendations is important in reducing the risk of HPV," confirmed that participants perceived the low-efficacy condition to be less certain to prevent HPV than the high-efficacy condition ($M = 4.16$ vs. $M = 4.80$), $F(1, 193) = 3.21, p < .05$.

Self-efficacy. Perceived self-efficacy was measured by asking participants to rate the extent to which they felt they could actually perform the recommendations and reduce their likelihood of getting HPV. A median split divided the sample into the low ($M = 5.33, n = 88$) and high ($M = 6.58, n = 108$) self-efficacy conditions, $F(1, 194) = 302.65, p < .001$.

Persuasion. Six 7-point semantic differential scales were used to measure participants' estimates on how persuasive they thought the pamphlet was, how likely they were to follow the recommendations in the future, how convincing the pamphlet was, the extent to which this pamphlet would influence them in future decisions to follow the recommendations, whether they were more likely to follow the recommendations after reading this pamphlet than before, and how interested they would be in receiving more information about HPV. A factor analysis revealed that two of these measures—how likely they are to follow the recommendations in the future and how interested they would be in receiving more information—loaded on the same factor and thus were averaged to provide the persuasion measure. This persuasion measure closely mirrors the persuasion index reported by Rook (1987).

Perceived vulnerability. A 7-point scale measure of vulnerability asked participants to indicate how concerned they were about getting HPV. A second measure required participants to choose a number from 0 to 100 that indicates their perceived likelihood of getting HPV.

Elaboration. Elaboration on the message was measured by asking participants to list the thoughts and feelings that crossed their minds as they read the

pamphlet. They were told not to describe what was in the pamphlet itself, but rather what was going through their mind as they read it. One point was allocated for each thought listed: The sum reflects the total elaboration score. Two coders, blind to the experimental treatments, categorized responses into thoughts related to the recommendations (e.g., "I try to carry condoms with me when I go out at night.") and thoughts related to the consequences (e.g., "I would break up with my girlfriend if she told me she had HPV."). The sum of these two types of thoughts reflects the message-related elaboration score. Sixty-five percent of total thoughts were message related, and the remainder either were related to the pamphlet (e.g., "It is folded funny.") or were altogether irrelevant. In addition, the coders subdivided the message-related thoughts into two categories: positive thoughts that support the message and its recommendations (e.g., "I think these recommendations are helpful.") and negative thoughts that counterargue the message and its recommendations (e.g., "I don't think that getting enough sleep and eating right has anything to do with my chances of getting HPV."). Fifty-six percent of message-related thoughts were positive support arguments.

Covariates. The questionnaire included measures of a number of possible covariates. Individual differences like prior knowledge of HPV through either direct or vicarious experience were assessed using a variety of measures. Participants were asked to indicate whether they, their current or previous partners, or any friends have ever been diagnosed with HPV; whether they were ever tested for HPV; and whether testing for sexually transmitted diseases (STDs) is part of their routine physical. They also reported their gender, age, and sexual behavior frequency (at least once in the last month, 6 months, 1 year, or never).

Results

The results confirm our hypothesis that vivid information is more persuasive than nonvivid information only under conditions of high perceived self-efficacy. An analysis of variance (ANOVA) indicates a significant interaction effect of Self-Efficacy \times Vividness, $F(1, 192) = 6.94, p < .05$, and a marginally significant main effect of self-efficacy on persuasion, $F(1, 192) = 1.74, p < .10$. Table 1 presents means and standard deviations for each condition. As expected, vivid information is more persuasive than nonvivid information for the high self-efficacy condition, $F(1, 192) = 3.19, p < .05$. Consistent with our theorizing, vivid and nonvivid information are equally persuasive for the low self-efficacy condition, $F(1, 192) = 1.16, p > .25$. Simple contrasts within the vividness conditions reveal a significant increase in persuasion from low to high self-efficacy for the vivid but not the nonvivid information: vivid, $F(1, 192) = 5.50, p < .05$; nonvivid, $F < 1$.

TABLE 1
Means and Standard Deviations for the Effects of Self-Efficacy and Vividness:
Experiment 1 (HPV)

	<i>Low Self-Efficacy</i>				<i>High Self-Efficacy</i>			
	<i>Vivid</i>		<i>Nonvivid</i>		<i>Vivid</i>		<i>Nonvivid</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>
Persuasion	3.19	1.06	3.49	1.20	3.81	1.49	3.36	1.43
Total thoughts	1.72	1.24	1.74	1.47	2.0	1.36	1.77	1.25
Message-related thoughts	.98	1.15	1.07	1.14	1.45	1.21	1.00	1.05
Positive thoughts	.45	.63	.61	.73	1.00	1.03	.77	.77
Negative thoughts	.53	1.07	.46	1.05	.45	1.44	.23	1.11
<i>n</i>	46		42		51		57	

Self-efficacy was expected to have a stronger moderating effect than that of response efficacy. An ANOVA model that simultaneously estimated the effects of self-efficacy and response efficacy indicates a significant interaction of Self-Efficacy \times Vividness, $F(1, 188) = 3.66, p < .05$, and a marginally significant main effect of self-efficacy on persuasion, $F(1, 188) = 1.57, p < .10$. There were no other main effects or interactions ($ps > .10$). An ANOVA examining the separate effect of response efficacy confirms that response efficacy does not moderate the vividness effect: There were no significant main effects or interaction effect of Response Efficacy \times Vividness ($ps > .10$).

The coded elaboration measures (Table 1) provide insight into why the previously cited persuasion pattern was obtained. Total elaboration did not vary by vividness or self-efficacy condition ($Fs < 1$). However, the number of message-related thoughts (about recommendations and consequences) mirrors the persuasion pattern. Thus, a significant Vividness \times Self-Efficacy interaction, $F(1, 192) = 2.79, p < .05$, reveals that in the high-efficacy condition, vivid information generated more message-related thoughts than the nonvivid information, $F(1, 192) = 4.27, p < .05$; and within the vivid condition, high self-efficacy generated more message-related thoughts than low self-efficacy, $F(1, 192) = 4.21, p < .05$ (see Table 1). No other main effects or interactions were obtained. In addition, the subset of these thoughts that represents positive support arguments reflects the same interaction pattern, $F(1, 192) = 2.58, p < .05$. Within the high-efficacy condition, the vivid information generated marginally more positive thoughts than the nonvivid information, $F(1, 192) = 1.97, p < .08$, and within the vivid condition, high self-efficacy generated more positive thoughts than the low self-efficacy condition, $F(1, 192) = 10.46, p < .001$. A significant main effect shows more positive thoughts for high self-efficacy than low self-efficacy, $F(1, 192) = 8.80, p < .01$. There were no

significant main effects or interaction effects for negative thoughts across vividness or self-efficacy conditions ($ps > .10$).

An ANOVA on the perceived vulnerability measures showed that there were no main effects or interaction effect of self-efficacy and vividness ($ps > .10$). Analyses of covariance (ANCOVAs) were also performed on the dependent measure with gender, prior knowledge, previous sexual behavior, and prior testing and diagnosis of HPV as covariates. Results indicate that the HPV pamphlets (vivid and nonvivid) are more persuasive for those who have been previously diagnosed with HPV, $F(1, 192) = 14.39, p < .001$, and for those who have been previously tested for it, $F(1, 192) = 5.04, p < .05$. The interaction of Gender \times Self-Efficacy indicates that the pamphlets are more persuasive for high self-efficacy women than for high self-efficacy men, $F(1, 192) = 3.11, p < .05$. There were no other main or interaction effects of the covariates with vividness or self-efficacy.

Discussion

The results of Experiment 1 support our conceptualization that vivid information is more persuasive than nonvivid information under conditions of high self-efficacy but not low self-efficacy. Because both response efficacy and self-efficacy have been shown to be important in motivating behavioral compliance, we also manipulated two levels of response efficacy. Consistent with our expectations, only perceptions of self-efficacy moderate the effect of vivid information on persuasion. In other words, regardless of the efficacy of the recommendations, only when participants believed they could follow the recommended behaviors did vivid information disproportionately influence judgment.

Experiment 2 was undertaken to test the robustness of the Vividness \times Self-Efficacy interaction by employing a different operationalization of vividness and a different health context. We use another common manipulation of vividness—pictures versus text—in a pamphlet on skin cancer.

EXPERIMENT 2

Stimulus and Measures

One hundred twenty-three graduate and undergraduate business students were given a five-page color brochure on the consequences of skin cancer and recommendations of a self-examination or reduced exposure to the sun.¹ The brochure entitled *Facts On Skin Cancer* was designed to resemble actual brochures disseminated by the American Cancer Society (1988) and other health organizations. The first page contained facts on skin cancer (e.g., "Every year, about 450,000 Ameri-

cans are diagnosed with skin cancer.”). The next two pages presented either vivid or nonvivid information on the warning signs of skin cancer; this was followed by recommended behavioral actions (see Appendix B).

Vividness. Vividness was manipulated through the use of pictures versus text to describe the physical warning signs of skin cancer (cf. Taylor & Thompson, 1982, for a review of similar manipulations). The nonvivid version (text only) consisted of five descriptions of what skin cancer can look like (e.g., “A smooth growth with an elevated, rolled border and an indentation in the center.”). The vivid pamphlet presented the same textual descriptions accompanied by a color photograph illustrating the text (American Cancer Society, 1988; see Figure B.1 in Appendix B). A manipulation check requiring participants to rate on a 7-point scale how easy it was to picture or otherwise imagine the vivid/nonvivid information confirms that the pictures are more vivid than the text only information ($M = 4.95$ vs. $M = 4.00$), $F(1, 119) = 9.00, p < .001$.

Self-efficacy. Perceived self-efficacy was measured by asking participants to rate the extent to which they felt they could actually perform the recommendations and reduce their likelihood of getting skin cancer. A median split divided the sample into the low and high self-efficacy conditions ($M = 3.53$ vs. $M = 6.58$), $F(1, 120) = 354.37, p < .001$.

Persuasion. Six 7-point semantic differential scales were used to measure participants' estimates on how persuasive they thought the pamphlet is, how likely they are to follow the recommendations in the future, how convincing the pamphlet is, the extent to which this pamphlet will influence them in future decisions to follow the recommendations, whether they are more likely to follow the recommendations after reading this pamphlet than before, and how interested they would be in receiving more information about skin cancer. All six items were averaged to provide one measure of persuasion because results of a factor analysis indicated they loaded on one factor and formed a reliable index ($\alpha = .81$).

Perceived vulnerability. A 7-point scale measure of vulnerability asked participants to indicate how concerned they were about getting skin cancer. A

¹To be consistent with Experiment 1, we also manipulated two levels of response efficacy in Experiment 2. The low-response efficacy behavior was self-examination, and the high-response efficacy behavior was reduced exposure to the sun. A manipulation check confirmed that the high-response efficacy behavior was perceived to be more certain to prevent skin cancer than the low-response efficacy behavior ($M = 6.09$ vs. $M = 5.18$), $F(1, 119) = 24.11, p < .001$.

second measure asked participants to indicate on a 7-point scale how susceptible they felt to skin cancer.

Elaboration. Elaboration on the message was measured by asking participants to list the thoughts and feelings that crossed their minds as they read the pamphlet. One point allocated for each thought listed reflects the total elaboration score. Two coders, blind to the experimental treatments, categorized responses into message-related thoughts about the recommendations (e.g., "I always use sunscreen at the beach.") and the consequences (e.g., "I wonder if that mark on my arm is skin cancer."). Seventy-six percent of total thoughts were message related, and the other thoughts were irrelevant or related to the structure of the pamphlet. These message-related thoughts were subdivided into two categories: positive thoughts that support the message and its recommendations (e.g., "I never knew what skin cancer looked like—I will check myself when I go home.") and negative thoughts that counter-argue the message and its recommendations (e.g., "People who wear hats and long sleeves in the sun look stupid."). Eighty-three percent of message-related thoughts were positive support arguments.

Covariates. The questionnaire included measures of a number of possible individual difference covariates. Participants were asked to indicate their gender, age, prior knowledge of skin cancer, whether they or anyone in their family have ever been diagnosed with skin cancer, whether they spent a great deal of time outdoors last summer, and their familiarity with American Cancer Society health brochures.

Results

We hypothesized that vivid information will be more persuasive than nonvivid information only under conditions of high-perceived self-efficacy, as indicated by a significant Self-Efficacy \times Vividness interaction. In addition, we expect self-efficacy to have a stronger moderating effect than response efficacy. An ANOVA examining the simultaneous effects of self-efficacy and response efficacy shows a marginally significant interaction effect of Self-Efficacy \times Vividness on persuasion $F(1, 114) = 1.61, p < .10$, along with significant main effects of self-efficacy, $F(1, 114) = 2.74, p < .05$, and response efficacy, $F(1, 114) = 5.49, p < .05$.

Given these unexpected results, we conducted a closer examination of the relation between response efficacy and self-efficacy in these data. The two were found to be significantly correlated ($r = .43, p < .01$): Participants perceived that they were better able to reduce exposure to the sun than do a self-examination to check for cancer. The impact of this correlation was examined in an ANOVA in

which response efficacy was dropped from the analysis and the effects associated with self-efficacy and vividness were estimated.² As originally expected, this analysis established a significant interaction effect of Self-Efficacy \times Vividness on persuasion, $F(1, 118) = 2.98, p < .05$. See Table 2 for means and standard deviations for each condition. Similar to Experiment 1, vivid information is more persuasive than nonvivid information for the high self-efficacy condition, $F(1, 118) = 4.37, p < .05$, but equally persuasive for the low self-efficacy condition ($F < 1$). Simple contrasts within the vividness conditions reveal a significant increase in persuasion from low to high self-efficacy for the vivid but not the nonvivid information: vivid, $F(1, 118) = 2.65, p < .05$; nonvivid, $F < 1$.

The results for the coded elaboration measures (see Table 2) are consistent with those in Experiment 1. The number of message-related thoughts (about recommendations and consequences) mirrors the persuasion pattern. Specifically, a significant Vividness \times Self-Efficacy interaction, $F(1, 118) = 4.35, p < .05$, reveals that within the high-efficacy condition, the vivid information generated more message-related thoughts than the nonvivid information, $F(1, 118) = 3.29, p < .05$, and within the vivid condition, high self-efficacy generated more message-related thoughts than low self-efficacy, $F(1, 118) = 4.51, p < .05$ (see Table 2). No other main effects or interactions were obtained. In addition, the subset of these thoughts that represents positive support arguments reflects the same interaction pattern, $F(1, 118) = 4.06, p < .05$: Within the high-efficacy condition, the vivid information generated more positive thoughts than the nonvivid information, $F(1, 118) = 5.03, p < .05$, and within the vivid condition, high self-efficacy generated more positive thoughts than the low self-efficacy condition, $F(1, 118) = 5.17, p < .05$. No other main effects or interactions were obtained. There were no significant main effects or interactions for total elaboration or negative thoughts by vividness or self-efficacy conditions ($ps > .10$).

There were no main effects or interaction effect of self-efficacy and vividness on perceived vulnerability ($ps > .10$). ANCOVAs were performed on the dependent measure with gender, prior knowledge, whether they or anyone in their family have ever been diagnosed with skin cancer, whether they spent a great deal of time outdoors last summer, and their familiarity with American Cancer Society health brochures as covariates. None of these covariates reach significance ($ps > .10$).

² An ANOVA that estimated the response efficacy effects separately (i.e., without self-efficacy in the model) showed a significant Response Efficacy \times Vividness interaction, $F(1, 119) = 3.68, p < .05$, and a marginally significant main effect of response efficacy, $F(1, 119) = 2.41, p < .10$. Thus, in these data, one cannot uniquely implicate self-efficacy or response efficacy as moderating the vividness effect on persuasion. Moreover, the two different behaviors used to represent levels of response efficacy may differ on other dimensions (e.g., frequency of use). Given these limitations of the response efficacy manipulation, we focus only on the self-efficacy measure in subsequent analysis.

TABLE 2
Means and Standard Deviations for the Effects of Self-Efficacy and Vividness:
Experiment 2 (Skin Cancer)

	<i>Low Self-Efficacy</i>				<i>High Self-Efficacy</i>			
	<i>Vivid</i>		<i>Nonvivid</i>		<i>Vivid</i>		<i>Nonvivid</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>
Persuasion	4.43	1.12	4.60	1.17	4.93	1.11	4.34	1.37
Total thoughts	5.80	2.89	6.25	3.14	7.05	2.43	6.41	2.49
Message-related thoughts	4.24	1.83	5.00	3.01	5.44	2.08	4.50	1.90
Positive thoughts	3.60	2.10	4.12	3.14	5.00	2.21	3.73	2.22
Negative thoughts	.64	1.32	.88	1.23	.44	.75	.77	1.10
<i>n</i>	25		24		39		34	

DISCUSSION

In our article, we highlight the importance of studying message effects in a health context. Recommendations contained in health messages can be more difficult to follow than typical nonhealth advertisements. Therefore, self-efficacy differences may influence when vivid information is more persuasive than nonvivid information in a health communication. Two studies, one on sexually transmitted disease and another on skin cancer, show the disproportionate influence of vivid over nonvivid material under high self-efficacy. This vividness effect disappears under low self-efficacy. Both experiments also show that vivid information is more persuasive in the high versus the low self-efficacy condition. Response efficacy, which was correlated with self-efficacy, shows a similar pattern of effects on persuasion, but only in Experiment 2.

Analysis of total elaboration, message-related elaboration, and positive and negative thoughts provides insight into the previously mentioned persuasion pattern. Although total elaboration did not vary by vividness or self-efficacy, message-related thoughts (about consequences and recommendations) mirrored the persuasion pattern. There were a greater number of message-related thoughts in the vivid versus the nonvivid condition for high self-efficacy, and a greater number of message-related thoughts for high versus low self-efficacy in the vivid information condition.

The message-related thoughts were categorized into positive support arguments and negative counterarguments. Results reveal more positive thoughts in the vivid versus the nonvivid condition for high self-efficacy and more positive thoughts in the vivid condition for high versus low self-efficacy. This pattern is consistent with

the persuasion results and with message-related elaboration. Negative thoughts were constant across conditions. Thus, when people believed they could successfully reduce the threat (high self-efficacy), vivid information generated more positive support arguments and increased the persuasiveness of the pamphlet.

The cognitive response measures (Tables 1 and 2) show a difference in the mean absolute number of thoughts listed by participants across the two experiments. The average number of message-related thoughts in Experiment 2 was 4.81 (total elaboration was 6.43) versus 1.14 in Experiment 1 (total elaboration was 1.80). The limited number of thoughts in Experiment 1 may reflect possible participant discomfort in discussing a sexually transmitted disease. By contrast, skin cancer is a less personal (sensitive) topic, and participants expressed their reactions more freely.

Despite the different health contexts, the results obtained were consistent across our two studies as well as across two manipulations of vividness: case versus abstract information and pictures versus text. However, we conducted additional analyses to further increase confidence in the robustness of our findings: (a) the test for combining the results of independent studies of the same hypothesis, (b) the unbiased estimate of effect size, (c) homogeneity of statistical tests and effect size, and (d) the number of studies needed to reverse the conclusion (Fail Safe N). The Stouffer weighted combined test (see Wolf, 1986, p. 20) indicates that our hypothesis is significant across both studies ($p < .01$; combined $z = 2.55$). The unbiased (weighted average) estimate of effect size (.37) is in the medium range (Wolf, 1986, p. 27). The tests for homogeneity of statistical tests and effect size (Wolf, 1986, pp. 44–45) indicate that although we used different operationalizations of vividness, different contexts, and different persuasion measures, the studies provide a common homogeneous estimate of population effect size—homogeneity of statistical test, $\chi^2(1) = .05$; homogeneity of effect size, $\chi^2(1) = .28$. Finally, analysis of Cooper's (1979) Fail Safe N (see Wolf, 1986, p. 38) shows that it would take approximately five additional studies to reverse the overall probability of the combined test.

We propose that varying levels of perceived self-efficacy can explain and predict the conditions under which a vividness effect will occur for a health-related message. Our studies use a measured value of perceived self-efficacy to split the respondents into two groups (low or high) of perceived self-efficacy. However, self-efficacy perceptions might be generally higher for certain behaviors (e.g., dental flossing) than for others (e.g., changing diet and exercise habits). Our reasoning suggests that the vividness effect would be accentuated for behaviors with generally higher versus lower self-efficacy. Future research might replicate these studies using a manipulation of behaviors varying in self-efficacy.

Future research might also further explore the relation between elaboration and perceived self-efficacy. In two studies of vividness in a nonhealth context, contrasts within the vivid condition from low to high levels of message elaboration show a positive linear effect on persuasion (Keller & McGill, 1994; McGill & Anand,

1989). By contrast, other studies have not found a difference (Kisielius & Sternthal, 1984, Study 1) or even a decrease (Kisielius & Sternthal, 1984, Study 2) in the persuasiveness of vivid information from the low- to high-elaboration conditions. The present studies also found no difference in total or message-related elaboration across low to high self-efficacy. These mixed findings suggest that it is not elaboration itself that accounts for the persuasiveness of the vivid message; perhaps it is the centrality of the vivid information to the message itself. In our study and in the studies by McGill and Anand (1989) and Keller and McGill (1994), the portion of the message that contained the vivid/nonvivid manipulation was central to the judgment. In our study, information on the *consequences* of the disease is central to one's decision to change a health behavior. Likewise, information on product *attributes* is central to one's evaluations of the products (Keller & McGill 1994; McGill & Anand, 1989). By contrast, the use of pictures to illustrate statements about the product in the Kisielius and Sternthal (1986) studies "did not reinforce the information presented in the message" (p. 424). Thus, perhaps when vivid information is central to judgment formation, an increase in motivation to process the message (high self-efficacy, high elaboration) increases the persuasiveness of this information, but when vivid information is likely to generate noncentral or irrelevant thoughts, the vividness effect disappears or reverses.

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APPENDIX A: FACTS ON HPV

What Is HPV?

HPV stands for human papilloma virus, a family of at least 60 viruses, about one-third of which cause genital problems that affect both males and females. These problems include: (1) genital warts and (2) cell changes, especially in the female cervix, that can be precancerous.

How Is HPV Spread?

HPV is spread primarily through genital, oral and anal sexual contact.

Can HPV Be Cured?

In most cases, lesions can be cured by proper treatment and follow-up. The majority of experts believe that HPV is not eliminated from the body, but can be controlled by the immune system.

How Is HPV Treated?

Genital warts are treated in a variety of ways depending on the size and location of the warts and the areas that need to be treated. Some forms of treatment may cause temporary pain or discomfort. The treatments now available are cryotherapy, laser surgery, liquid nitrogen, 5-fluorouracil (5-FU) cream, trichloroacetic acid, podophyllin, and interferon. When treatment is required, the medical practitioner will describe each method and explain which is most appropriate. Cervical lesions are

treated with cryotherapy or laser—both are equally effective. Follow-up Pap smears on a regular basis are very important.

RECOMMENDATIONS

If you use the following precautions, you will be able to avoid contracting HPV. If you do have HPV, using these same precautions may help control the development of lesions.

1. Practice Safer Sex

As with any STD, abstinence is the surest way to avoid infection. If you have sexual intercourse, use latex condoms. Laboratory studies have shown infection rates are lower in condom users. When condoms are used, you can reduce your risk of spreading or getting HPV.

2. Have Regular Check-ups

If you include HPV testing as part of your regular medical check-up, especially if you have changed partners or have more than one partner, you will be able to control the infection before symptoms appear.

3. Take Care of Your Body

As with any other virus, you are less susceptible to infection when you are in good health. And, if you have HPV, a strong immune system is important in bringing the disease under control. Your immune system will be kept healthy by eating right, getting enough sleep, exercising regularly and avoiding alcohol and other mood altering drugs.

**Clinical studies show that following the above
recommendations will reduce your risk of contracting HPV
by TWENTY [EIGHTY] PERCENT.**

JEFF'S STORY

When Linda hit me with the news that she had HPV, I was shocked. My girlfriend had an STD¹. How did she get it? I thought we had a monogamous relationship. Did I have HPV too? What was going on here?

Linda said either of us could have gotten the virus long before we met. And once one of us contracted HPV the likelihood was both of us would get it. The only way to find out for certain if I had HPV was to get an exam since the warts can be invisible to the naked eye.

Then she said we'd have to start using condoms and *spermicide to decrease the likelihood of further outbreaks*. She added that they would provide protection against other STDs – something we had never really considered until now. I was not thrilled with the prospect of using condoms, but she had already bought some in different styles and said we could practice using them. My mood started getting a little better.

Linda told me how much she cared about me and that she hoped we could work this through together. She asked me whether I needed some time to think about everything and I said I did.

I went to the health center this afternoon and had a checkup. The doctor applied vinegar to my penis to make any warts more apparent. He found three small flat warts and treated them. I felt a slight burning sensation, but it went away pretty quickly. I have to go back for follow-up to keep the virus under control.

I also read the health center handouts on STDs and HPV. I always had associated STDs with prostitutes and drug addicts, but I was wrong – more than one million people are diagnosed with HPV every year. Now I realize everyone who is sexually active is at risk. Even me.

Linda and I are going to meet in a couple of hours. I've gone back and forth a couple of times about our relationship, but basically I'd like us to stay together. I'll tell her that tonight.

LINDA'S STORY

When I learned that the results of my Pap smear were abnormal, I was really scared. I had gone to the health service for my regular examination. I didn't think anything was wrong.

The nurse told me that the Pap smear results showed that I needed further evaluation for HPV – human papillomavirus, a family of viruses that sometimes causes genital warts or precancerous conditions.

I had nothing but questions. How did I get a sexually transmitted disease? I don't sleep around. How will I ever tell my boyfriend? And worse, would I get cancer?

The likelihood of my getting cancer was very slight, the nurse explained, but I did need a colposcopy – an examination of my cervix and other genital areas to check for genital warts and possibly take tissue samples for testing.

I felt dirty, but the nurse told me that it would be a good idea if I could look at HPV for what it is – a disease, not a moral statement. Nowadays, anyone who is sexually active can get a sexually transmitted disease, or STD. And, HPV is becoming an epidemic on college campuses.

HPV lesions can be successfully treated, she continued. Although the virus most likely remains in the tissues, the ultimate goal of treatment is for lesion growth to be suppressed by the immune system. She added that the chances of my treatment being successful would improve if my boyfriend were treated at the same time.

As soon as I got back to my dorm, I called my best friend, Liz. I was feeling pretty anxious and sort of panicky. How was I going to tell my boyfriend, Jeff? Initially, I was frightened about telling him anything, but knew that I would want to know if the situation were reversed. Liz and I talked about how I would feel if Jeff blamed or rejected me. It would be tough, but I'd cope.

I decided to get some information from the health center about what kinds of sex would be okay for us before I talked to Jeff so I could reassure him that this wasn't the end of our sex life. I also needed to reassure myself.

Last Tuesday, I went for my colposcopy. The doctor used a colposcope – a magnifying instrument like a microscope – to look more closely at my cervix. He also took samples to send to the lab and treated some warts near my vagina. It was fairly quick and I only felt a slight pinch.

Thursday I got the colposcopy results. I do have HPV on my cervix. I made an appointment to return for treatment. After that, I will have close follow-up, including regular Pap smears as recommended.

This morning Jeff and I had "the talk." Definitely sweaty palms time for me. I told him about HPV as calmly as I could. We decided to continue our conversation tomorrow.

FIGURE 1 Vivid (personal) stories

MEN'S STORIES

Most men are shocked when they find out they have HPV. Common responses include questions like, "Does my girlfriend have it?" "How did she get it?" "I thought we had a monogamous relationship."

Either partner could get the virus before they met each other. Statistically, once one of them contracted HPV, the likelihood was that both partners would get it. In the majority of cases, men can only be certain they have HPV by getting an exam, since the warts can be naked to the invisible eye.

A large percentage of men who had HPV said they started using condoms and spermicide to decrease the likelihood of further outbreaks. This also provides protection against other STDs — something most men never really consider. On average, men responded that they were not thrilled with the prospect of using condoms, but since they come in different styles, it's not so bad.

The majority of couples who have HPV generally need some time to think about everything. They go back and forth a couple of times about their relationship, but on average they stay together.

Generally, the checkup at the health center is as follows: the doctor applies vinegar to the man's penis to make any warts more apparent, the total number of warts found varies by individuals but the average is three, a good proportion of the men feel a burning sensation, but it goes away quickly, the majority of men go back for follow-up to keep the virus under control.

Most men read the health center handouts on STDs and HPV. Seventy percent of them had previously associated STDs with prostitutes and drug addicts, but they were wrong. Now they realize everyone who is sexually active is at risk.

WOMEN'S STORIES

The women who learn their Pap smears are abnormal are really scared. The majority didn't think anything was wrong.

When told that the Pap smear results showed further need for evaluation for HPV, which can cause genital warts or precancerous conditions, most of the women ask the same questions: "How did I get a sexually transmitted disease?" "I don't sleep around." "How will I tell my boyfriend?", and worse, "Would I get cancer?"

The likelihood of getting cancer is slight, but most women need a colposcopy — an examination of the cervix and other genital areas to check for warts and take tissue samples for testing. The colposcope is a magnifying instrument like a microscope. On average, the treatment is fairly quick and most women only feel a slight pinch. The majority of women need to return for treatment and then have close follow-up, including regular Pap smears as recommended.

A good percentage of the women feel dirty after learning they have HPV, but it is a disease, not a moral statement. Nowadays, anyone who is sexually active can get a sexually transmitted disease. And HPV is becoming an epidemic on college campuses.

HPV lesions can be successfully treated. Although the virus most likely remains in the tissues, the ultimate goal of treatment is for lesion growth to be suppressed by the immune system. On average, the chance of a successful treatment improves if these women's boyfriends were treated at the same time.

A large percentage of women told us they felt anxious and panicky and needed to confide in a close woman friend. Most women are afraid to tell their boyfriends, but they realize they would want to know if the situation were reversed.

Most women read information from the health center about what kinds of sex would be okay for them to have so that they can reassure their boyfriends, and themselves, that this isn't the end of their sex life.

FIGURE 2 Nonvivid (impersonal) stories

APPENDIX B

Facts on Skin Cancer

Every year about 450,000 Americans are diagnosed with skin cancer.

Skin cancer most often occurs among people who work or spend a great deal of recreational time in the sun—sunbathing, gardening, sailing, fishing or hiking. The risk doubles for people who have had one severe sunburn in their teens or twenties.



Fig 1

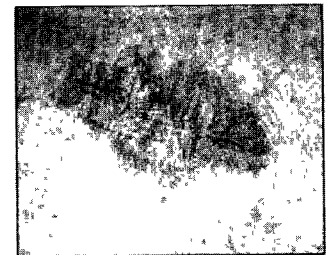


Fig 3



Fig 5

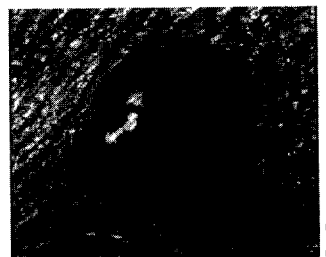


Fig 7

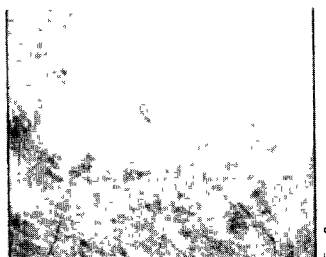


Fig 9



Fig 2



Fig 4



Fig 6



Fig 8



Fig 10

AN OPEN SORE that bleeds, oozes or crusts and remains open for three or more weeks. A persistent, non-healing sore is a very common sign of an early basal cell carcinoma

A REDDISH PATCH, or irritated area, frequently occurring on the chest, shoulders, arms or legs. Sometimes the patch crusts. It may also itch or hurt. At other times, it persists with no noticeable discomfort

A SMOOTH GROWTH with an elevated, rolled border and an indentation in the center. As the growth slowly enlarges, tiny blood vessels may develop on the surface

A SHINY BUMP, or nodule, that is pearly or translucent and is often pink, red or white. The bump can also be tan, black or brown, especially in dark-haired people, and can be confused with a mole

A SCAR-LIKE AREA—white, yellow or waxy—which often has poorly defined borders. The skin itself appears shiny and taut. Although a less frequent sign, it can indicate the presence of an aggressive tumor

FIGURE 1 The Five warning signs

Recommendations

Self-examinations: Prevention of skin cancer is obviously the most desirable weapon against this disease. But if a lesion should develop, it may be curable if caught in the early stages. To ensure that any developing lesion is caught in the early stage, a regular program of monthly self-examinations should be followed. By doing the self-examination, you will be familiar with your skin and will learn your own pattern of moles, freckles and “beauty marks.” You will be more alert to changes in the number, size, shape and color of pigmented areas. If any changes are noticed, call your dermatologist. This step-by-step method, if done monthly, will provide you with an “early warning system” against skin cancer.

Reduce exposure to the sun: Prevention of skin cancer is the most desirable weapon against this disease. By keeping your exposure to the sun at a minimum, you decrease your risks. By using a sunscreen with a Sun Protection Factor (SPF) of 15 or greater, and wearing wide-brimmed hats and protective clothing as much as possible, you will avoid ultraviolet rays. Swimmers should remember that the sun’s rays can reach down three feet into the water; re-apply the sunscreen after swimming. By avoiding direct sun at midday, from 10 a.m. to 3 p.m., when the sun’s rays are the strongest, you decrease your risks. These techniques, if properly followed, will decrease your risk of getting skin cancer.