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The authors explore the relationship between perceived efficacy, depth of processing, and message framing. They conduct two experiments on varying health-related issues: sexually transmitted disease and skin cancer. In both studies, the authors demonstrate that a low efficacy condition (i.e., when it is uncertain that following the recommendations will lead to the desired outcome) motivates more in-depth processing. They then show that when subjects process in-depth, negative frames are more persuasive than positive ones. In contrast, a high efficacy condition generates less effortful message processing in which positive and negative frames are equally persuasive.

When to Accentuate the Negative: The Effects of Perceived Efficacy and Message Framing on Intentions to Perform a Health-Related Behavior

The importance of the media in educating Americans about health risks has risen over the last decade in an effort to combat the increase in national health problems such as AIDS, drug abuse, and drinking and driving. It is estimated that 40% to 70% of all premature deaths and up to 66% of all disabilities could be prevented by controlling fewer than 10 health risk factors, such as diet, exercise and alcohol abuse (Signorielli 1993). The media, especially television, has become a major source of information about health risks and health behaviors for a majority of Americans. A study sponsored by the American Cancer Society (1980) reports that 82% of respondents cited television as a source of information about cancer (65% newspapers, 61% magazines, and 42% radio; Signorielli 1993). Similarly, Signorielli (1993) reports the results of a national survey that found television to be the most frequently mentioned source of information about AIDS. In addition, more than one fourth (27%) of money allocated to AIDS prevention and treatment in 1992 was spent on AIDS education and information (U.S. Department of Commerce 1993).

The magnitude of these figures highlights the role of the media in influencing health-related behaviors. Thus, it is increasingly important to understand the factors that influence the effectiveness of media appeals aimed at changing health-

related behaviors. To date, the success of these appeals varies widely, kindling controversy over the best ways to advertise and advocate health-related behavioral changes. For example, the Ad Council conducted a year-long study in four markets (10,000 households) to test the effectiveness of a televised fear appeal encouraging men to ask their doctors about colon cancer (Rothenberg 1991). As a result of the televised messages, the number of inquiries about colon cancer more than doubled in the test market area. The Advertising Research Foundation said that, "if the campaign, which consisted of a single commercial, had been broadcast throughout the country, it would have persuaded 2.7 million men over the age of 40 to consult physicians about the disease." (Rothenberg 1991). Other studies, however, support the view that such advertisements are not persuasive. A New York advertising agency concluded that its public service fear appeals were unsuccessful: "Very few people wanted to call the toll-free number." (Taylor 1991).

Dr. Jay A. Winsten, director of the Center for Health Communication at the Harvard University School of Public Health, suggests that it is difficult to identify factors that determine the effectiveness of health-related public service campaigns because they are not based on an adequate foundation of research (Rothenberg 1991). Despite this lack of systematic research, some advertisers and public service campaign designers have concluded that advertisements that arouse negative emotions undermine persuasion. For example, a recent study by the Harvard School of Public Health recommends that public service messages designed to deter certain behaviors should avoid message executions that

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evoke negative emotions and rely instead on the upbeat tactics used by advertisers of consumer products (Rothenberg 1990). One implication of the Harvard study is that public service campaigns using negative language to frame their messages are less effective than public service messages using positive frames. The terms *positive* and *negative* frames describe two ways of representing equivalent information (Maheswaran and Meyers-Levy 1990). In a public service campaign, positive frames present the positive consequences of adherence to the message recommendations (e.g., "If you quit smoking, you reduce the risk of developing lung cancer"), whereas negative frames describe the negative consequences of non-adherence (e.g., "If you don't quit smoking, you increase the risk of developing lung cancer").

A recent study by Maheswaran and Meyers-Levy (1990) sheds some light on the Harvard findings that positive frames may be more effective than negative frames by suggesting that positive frames are more effective than negative frames when subjects are not motivated to process the message. Low motivation to process the message often prevails in health contexts because people without apparent health problems typically engage in defensive tendencies to avoid the message (Ray and Wilkie 1970); consequently, the Maheswaran and Meyers-Levy results are consistent with the Harvard study in terms of the advantages of positive framing over negative framing.

Are positive frames always more effective than negative frames for communications on health? Three studies suggest otherwise. First, Maheswaran and Meyers-Levy (1990) show that when subjects *are* motivated to process the message and engage in effortful processing, negative frames are more effective than positive frames, because negative information is perceived to be more informative than comparable positive information. Second, Meyerowitz and Chaiken (1987) indicate that with a lower level of efficacy, that is, when it is uncertain that the recommendations will lead to the desired outcome, negative frames are more effective than positive frames. Specifically, during a four month follow up of a study on breast self-examinations, Meyerowitz and Chaiken (1987) found that women who received a negatively framed pamphlet were more favorably disposed toward performing a breast self-examination than women who received a positively framed pamphlet. Finally, Rothman and colleagues (1993) found that women responded more favorably to a negatively framed pamphlet on skin cancer self-examination than a positively framed pamphlet when the level of efficacy was low. Thus, for health concerns in which the level of efficacy is low or in which there is uncertainty that the recommended behavior will result in the desired outcome, negative frames may be more effective than positive frames.

Two issues deserve further investigation. First, the process underlying the effect of efficacy on framing remains untested. Although the Meyerowitz and Chaiken (1987) and Rothman and colleagues (1993) studies demonstrate that negative frames are more effective than positive frames in the low efficacy condition, there is no evidence about the effect of efficacy on the extent of processing. Second, these studies do not test the effect of framing across different lev-

els of efficacy. It is important to study different levels of efficacy because health recommendations vary widely in their abilities to reduce health-related threats. Additionally, advances in medical knowledge often change the perceived effectiveness of various techniques. For example, in women under 50 years of age, mammography historically has been viewed as more effective (high efficacy) than breast self-examinations (low efficacy) as a means of detecting breast cancer. However, medical studies are currently providing new evidence that mammography may be less efficacious than previously thought (Kolata 1993). As a result, the National Cancer Institute no longer endorses routine mammograms for women in their 40s, whereas the American Cancer Society and the American Medical Association still recommend regular mammograms for women in this age category, with the AMA suggesting a baseline mammogram at age 35 (Tanouye 1994). Such conflicting recommendations underscore the importance of investigating message effects across varying levels of efficacy.

The purpose of our study is to test the relationships between level of efficacy, depth of processing, and framing effects. If low efficacy conditions motivate more effortful processing, then designers of public service campaigns for health problems that do not have effective cures may use negative frames to motivate preventive action. Similarly, highly efficacious solutions that require less processing may use positive frames to motivate compliance. We conduct two studies with different operationalizations of perceived efficacy; both studies manipulate two levels of efficacy that correspond to the certainty with which adherence to the recommendations will lead to the desired outcome. We replicate the results of framing and perceived efficacy on depth of processing, attitudes, and intentions to follow the prescribed behavior in two different contexts. Study 1 examines the effects of efficacy and message framing on the effectiveness of a pamphlet on sexually transmitted diseases; Study 2 extends the generalizability of the framework by using a brochure on skin cancer.

PERCEIVED EFFICACY

Extent of Message Processing

Protection Motivation Theory (PMT) is largely responsible for formally incorporating the role of perceived efficacy in health communications (Rogers 1975, 1983). The model assumes that viewing a health communication provides the impetus for a person to assess the (1) severity of the event, (2) probability of the event occurring, and (3) belief in the efficacy of the recommendations. Numerous researchers have used PMT to study risk for health-related decisions (e.g., Struckman-Johnson et al. 1990; Tanner, Hunt, and Eppright 1991), and the results suggest that the efficacy of the recommendations to achieve the desired outcome is the most important predictor of behavioral intentions. Hence, only when a person feels that the recommended behavior is likely to lead to the desired outcome will adoption of recommendations occur.

Although the studies emphasize the effects of perceived efficacy on behavioral intentions, they give no consideration to the influence assessment of efficacy may have on sub-

jects' thought processes. As Gleicher and Petty (1992, p. 87) note, "These (efficacy) results, although informative about the interaction between the stated effectiveness of the proposed solution and the degree of perceived threat, do not provide data about the extent to which subjects processed the persuasive message."

A study by Gleicher and Petty (1992) provides some support for the effects of efficacy on extent of processing. Although Gleicher and Petty did not examine framing effects, their study provides some evidence that less certain behaviors induce motivation to process a persuasive message. They manipulated low versus high efficacy and message argument strength in a message on campus crime. The high efficacy condition stated that the program was highly likely to reduce crime on campus, whereas the low efficacy version indicated that the likelihood of success was questionable. They determined evidence for more effortful processing on the basis of whether subjects would make the distinction between strong and weak arguments. The subjects carefully evaluated the quality of the arguments only in the low efficacy condition; and they favored strong arguments over weak ones.

Gleicher and Petty (1992) suggest a cognitive reassurance theory to explain their results. When expectations of efficacy are high, subjects use this opinion as a basis for their attitudes. Because the statement of high efficacy suggests an effective solution to the threat, subjects do not need to carefully evaluate the message in order to find reassurance. The authors suggest that, in fact, subjects may avoid careful processing of the message for fear they might find some contradicting evidence. On the other hand, when expectations of efficacy are questionable, people carefully scrutinize the message to seek reassurance.

A study by Fredrickson (1985) also finds that highly uncertain decisions motivate increased information processing. When presented with an uncertain problem, decision makers comprehensively analyze the situation and search widely for information; in contrast, decision makers faced with a more certain opportunity will engage in little or no analysis of the situation.

Together, these studies suggest that conditions of low efficacy may generate more effortful processing than conditions of high efficacy. In other words, people are more likely to engage in in-depth processing of a message for a behavior that is less certain to lead to the desired outcome than for a behavior that is certain to produce the desired outcome. In the low efficacy condition, a person, who chooses to follow the recommendations, may indeed achieve the desired results but is not guaranteed of doing so. At the same time, they acknowledge that non-adherence could lead to some severe and threatening health consequences. Thus, people who receive a low efficacy message are faced with the complex task of evaluating the tradeoffs and deciding whether to comply with the message. In contrast, people who receive a high efficacy message are likely to be less motivated to engage in in-depth processing of a message for a behavior that is likely to lead to the desired outcome. Accordingly, we predict that message processing will be greater (less) under conditions of low (high) efficacy than high (low) efficacy.

The extent of message processing is evident in the types of thoughts that recipients generate after viewing the message (Greenwald 1968; Wright 1980). According to cognitive response theory, message recipients actively relate the information conveyed to their existing feelings and beliefs (Eagly and Chaiken 1993). The number of these cognitive responses serves as an indicator of the depth of the recipients' message processing. The responses also represent uniquely generated thoughts, not merely arguments recalled from the message itself.

As suggested by cognitive response theory, the number of message-related cognitive responses represents the extent of message processing, and a greater number of message-related cognitions signifies increased in-depth processing (Maheswaran and Meyers-Levy 1990). We derive the following hypothesis from the relationship between level of perceived efficacy and extent of message processing.

H₁: The number of message-related cognitive responses generated by the message will be greater for conditions of low perceived efficacy than for high perceived efficacy.

Message Framing

Although past studies have suggested that "future research will be required to determine the extent to which loss-framed (gain-framed) messages are equally or differentially effective in enhancing the performance of behaviors that do and do not involve elements of risk and uncertainty" (Meyerowitz and Chaiken 1987, p. 507), there is no direct evidence about the relationship between perceived efficacy and framing of advertising appeals. Fortunately, there is some information about the influence of depth of processing on framing effects. The subsequent studies indicate that negative framing is more effective than positive framing when subjects are processing in-depth. Because the previous section suggests that more in-depth processing is expected in the low efficacy condition than the high efficacy condition, we use these studies to predict the relationship between perceived efficacy and framing.

Many studies on attitude change demonstrate that factors that might influence persuasion under effortful processing do not necessarily influence persuasion under non-effortful processing (cf. Chaiken, Liberman, and Eagly 1989). Message framing is one of the factors identified as influencing persuasion under systematic processing (Maheswaran and Meyers-Levy 1990). Such studies have shown that under effortful processing, negative information is perceived to be more informative than comparable positive information because people tend to compare it to some internal standard or reference point. (For a review of the negativity bias, see Kanouse and Hanson 1972.)

Research by Maheswaran and Meyers-Levy (1990) provides direct evidence that negative information is more effective than positive information when people carefully evaluate information.¹ On the basis of this evidence, we predict that people in the low efficacy condition will perceive that it is less likely that the recommended behavior will lead

¹In their study on message framing, Maheswaran and Meyers-Levy find that under effortful processing, negatively framed messages lead to greater intentions to take a diagnostic cholesterol blood test than corresponding positively framed messages.

to the desired outcome. Consequently, they will be motivated to engage in effortful processing and will be influenced by the overweighting of negative information. Thus, in the low efficacy condition, negatively framed messages will be more persuasive than positively framed messages.

People in the high efficacy condition will perceive that the recommended behavior will almost certainly lead to the desired outcome. Previous research shows that in the case of a more certain situation, people tend to exert less effort in evaluating the message (Gleicher and Petty 1992). Evidence on the direction of framing effects under less effortful processing conditions is mixed. Gleicher and Petty (1992) found that when people do not carefully process the message, they equally favor the message recommendations regardless of argument quality. In their high efficacy condition, attitudes toward crime watch were equally favorable in the strong and weak arguments conditions. Similarly, in Rothman and colleagues (1993) high efficacy condition, attitudes toward cancer prevention were also equally favorable in the positive and negative conditions. These studies suggest that the effects of framing disappear when people do not carefully process the message.

Contrary to this evidence, a framing study by Maheswaran and Meyers-Levy (1990) reports that positive information is weighted more than negative information when people are engaged in non-effortful processing. Petty, Cacioppo, and Schumann (1983) also suggest that positive information is more persuasive than negative information when the message is not extensively processed.

If people exposed to the high efficacy condition are not motivated to evaluate carefully and process the communication and are unlikely to integrate the information into a weighted overall evaluation, then when it is highly certain that the recommended behavior will achieve the desired outcome, negatively framed messages should *not* be more persuasive than positively framed messages. Rather, positively framed messages should influence behavioral intentions at least to the same extent (Gleicher and Petty 1992; Rothman et al. 1993) or more (Maheswaran and Meyers-Levy 1990; Petty, Cacioppo, and Schumann 1983) than negatively framed messages. The nature, then, of the interaction between efficacy and framing is

H_{2a}: In the low efficacy condition, negatively framed messages will lead to more favorable attitudes and greater intentions to follow the recommended behavior than will positively framed messages.

H_{2b}: In the high efficacy condition, positively framed messages will lead to equal or more favorable attitudes and equal or greater intentions to follow the recommended behavior than will negatively framed messages.

STUDY 1

Method

Ninety-four undergraduate students completed the experiment, which was run as a full factorial between-subject with two levels of efficacy (low versus high) and two levels of framing (positive versus negative). We chose a sexually transmitted disease (STD), because the occurrence of STD is particularly high among college students—the American College Health Association (ACHA) (1989) estimates that

the incidence of STD approaches 10–15% of the student population in any year. We designed the pamphlets to mimic those distributed by the ACHA. Each student received a cover page and a color fold-out four-page pamphlet called HPV . . . WHAT'S THAT? Page one gave information on what HPV is (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."); page two explained how HPV is spread, cured, and treated; and pages three and four contained recommendations for the prevention of HPV (e.g., "Practice Safer Sex", "Have Regular Check-ups," "Take Care of Your Body").

Framing. Because the hypotheses pertain to the differential effectiveness of positively versus negatively framed language, half of the students received the recommendations stressing the negative consequences of non-adherence, whereas the others received the same information stressing the positive consequences of adherence (Meyerowitz and Chaiken 1987). We display an example of the framing manipulation (the negative framing is in brackets) subsequently.

If you [don't] use the following precautions, you will [not] be able to avoid contracting HPV. If you do have HPV, [not] using these same precautions may help [speed] control the development of lesions.

Efficacy. We manipulated low versus high efficacy by varying the certainty with which adherence to the recommendations will lead to the desired outcome. Following previous manipulations of efficacy (Gleicher and Petty 1992; Rogers and Mewborn 1976), the low efficacy condition reported that "Clinical studies show that [not] following the above recommendations will [increase] reduce your risk of contracting HPV by TWENTY PERCENT." The high efficacy condition reported that "Clinical studies show that [not] following the above recommendations will [increase] reduce your risk of contracting HPV by EIGHTY PERCENT." To test whether level of efficacy determines extent of message processing (H₁), subjects also received the efficacy information at the beginning of the experiment in a cover sheet. Specifically, we informed subjects that there was a 20% [80%] chance that the recommendations they were about to read were effective.

Procedure

Prior to distributing the HPV pamphlets, we gave subjects a pretest questionnaire to measure their prior knowledge of HPV (Meyerowitz and Chaiken 1987). The 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) if they know a lot about HPV, know more than most about HPV, and are very familiar with ways to prevent HPV. The students 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?" We included these pre-measures to explore the possibility that the framing or efficacy manipulation might interact with individual differences on prior knowledge and familiarity; however, individual differences did not interact with framing or efficacy to affect any of the dependent measures.

After completion of the prior knowledge measures, subjects were presented with the HPV pamphlet and asked to read it. A second questionnaire queried subjects on extent of processing, persuasion, manipulation checks, and covariates in that order. At the end of the experiment, we debriefed the subjects, informed them about the purpose of the experiment, and explained that the efficacy numbers were fictitious.

Experimental Measures

Dependent variables. We measured intention to comply with the recommendations by asking subjects to rate how likely they are to follow the recommendations overall and the specific recommendation (i.e., "take care of your body") on two seven-point scales from 1 = very unlikely to 7 = very likely. Subjects then rated the extent to which they agreed or disagreed with statements reflecting their attitudes toward the recommendations (very persuasive/not at all persuasive, useful/useless).

We measured the extent of message processing by having two coders unaware of the experimental conditions (inter-rater reliability = .96) categorize cognitive responses from an open-ended elaboration task (i.e., "Write down the thoughts that crossed your mind and how you were feeling as you read the pamphlet.") into one of two categories: (1) message-related cognitions (e.g., "More people should get tested/go to doctors if they are sexually active.") and (2) irrelevant cognitions that are not related to the message (e.g., "I want this experiment to end quickly."). This coding scheme is consistent with the majority of research guided by cognitive response theory (Eagly and Chaiken 1993).

Manipulation checks. The questionnaire included three checks on efficacy: a Likert rating scale, a multiple choice measure, and a recognition measure. The first check, which was adapted from Meyerowitz and Chaiken (1987), required students to rate their agreement on self efficacy and response efficacy on two seven-point scales: "Following the prevention 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." We used the second check, a multiple choice task, to make sure that subjects were aware of and paid attention to the statements containing "twenty percent" or "eighty percent;" thus, we asked subjects to circle the correct response (choices were: 20%, 80%, 50%, or none of the above). The third check, in the form of a true, false, and unsure question, was a recognition task that required subjects to indicate whether the brochure stated a rate of twenty (eighty) percent.

A framing manipulation check following Maheswaran and Meyers-Levy's (1990) study asked subjects to rate the extent to which the pamphlet stressed the negative implications of not following the behavior. As a second measure, subjects provided responses to a recognition test in which they indicated whether each of six phrases appeared verbatim in the pamphlet they had read. Half of the phrases were written in positive framing with the rest in negative framing. We allocated each correct answer one point for a total correct score and each incorrect answer one point for a total incorrect score.

Checks on possible confounds. Protection Motivation Theory postulates that although fear is not a necessary antecedent of persuasion, it may be a byproduct of processing the message. To check for this, we included a measure to assess subjects' levels of fear. Subjects were asked to rate on a seven-point scale from "not at all" to "very much so" how they were feeling as they read the pamphlet. Similar to Gleicher and Petty's (1992) study, we summed a five-item fear scale—fearful, nervous, scared, nauseated and uncomfortable—to indicate the level of fear.

Although we made no predictions regarding subjects' perceived severity of or perceived susceptibility to HPV, their perceptions might influence perceived efficacy (Rogers 1983) and so were included as dependent measures. We measured perceived severity on a three-item scale that asked subjects to rate the extent to which HPV is frightening, dangerous, and severe (Meyerowitz and Chaiken 1987). We also used two separate measures to assess perceived susceptibility. In a direct measure, subjects indicated on a seven-point scale how vulnerable they think they are to HPV. More indirectly, we asked them to allocate a number from 0 to 100 (with 0 meaning there is no possible chance) indicating their chance of actually getting the disease.

Next, we measured the amount of information presented in each pamphlet, the ease of comprehension, and the credibility of the pamphlets. If the pamphlets differed on any of these measures, the results could be open to competing explanations. To ensure that the amount of information did not vary between conditions, students rated the informativeness of the pamphlet on a seven-point scale ranging from "contained very little information" to "contained a great deal of information." To measure ease of comprehension, subjects rated the message on a two item seven-point scale (i.e., easy to comprehend/difficult to comprehend and easy to follow/difficult to follow).

Three questions queried subjects as to the credibility of the message. The questions asked for the level of agreement with statements such as "The information in the pamphlet is credible;" "I think the information in the pamphlet is exaggerated;" and "I think the information in this pamphlet is unbelievable."

Covariates. The questionnaire ended with a number of possible covariates in the form of individual differences. We assessed individual differences, such as prior knowledge of HPV, either through direct or vicarious experience using a variety of measures. We asked subjects 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 if testing for STDs is part of their routine physical. They also checked the appropriate category for sexual behavior—at least once in the last month, six months, one year or never—sex, and age.

Results

Manipulation checks. The manipulation checks confirm that people perceive the recommended behavior in the high efficacy condition to be more certain to prevent HPV than the recommended behavior in the low efficacy condition on the Likert scale items ($M = 5.91$, $s.d. = 1.16$ versus $M = 5.47$, $s.d. = 1.10$, $F(1,91) = 3.59$, $p < .05$, $\omega^2 = .04$), the mul-

Table 1
MEANS AND STANDARD DEVIATIONS FOR THE EFFECTS OF
MESSAGE FRAMING AND EFFICACY ON PERSUASION:
STUDY 1

	Low Efficacy Frame		High Efficacy Frame	
	Negative	Positive	Negative	Positive
Behavioral Intentions	5.75 ^a (1.97) ^b	5.05 (1.21)	4.46 (1.57)	4.62 (1.48)
Attitude	5.77 (.87)	5.27 (.80)	5.38 (.97)	5.36 (1.25)
n	22	22	25	25

^aTreatment means

^bStandard deviation

multiple choice format (index for testing proportions = 5.67; $p < .001$; proportion correct = 80.6, proportion incorrect = 19.4), and the recognition task (for low efficacy: $F(1,43) = 22.56$, $p < .001$, $M = 1.25$, $s.d. = .84$ versus $M = .32$, $s.d. = .64$; for high efficacy: $F(1,48) = 54.32$, $p < .001$, $M = 1.34$, $s.d. = .82$ versus $M = .18$, $s.d. = .48$). As both the means are above the midpoint on the Likert scale, we will refer to the two levels as "lower" and "higher" to represent their relative difference.

We used two different measures to check the framing manipulation; results provide full support on the first measure and partial support on the other, and confirm that subjects accurately rated the extent to which the pamphlet stressed the negative implications of not following the behavior (1 = not at all, 7 = a great deal) higher in the negative ($M = 5.34$, $s.d. = 1.52$) than in the positive frame condition ($M = 4.45$, $s.d. = 1.82$, $F(1,93) = 6.69$, $p < .01$, $\omega^2 = .07$). Results of the recognition test for the framing manipulation indicate that those subjects in the positive frame condition had significantly more correctly recognized phrases ($M = 2.96$, $s.d. = 1.02$) than incorrectly recognized phrases ($M = 1.87$, $s.d. = 1.05$, $t(1,46) = 4.57$, $p < .001$); however, results fail to achieve significance in the negative frame condition ($p > .10$).

Message processing. Examination of the cognitive responses confirms H_1 ; the number of message-related cognitive responses differs between the lower and higher efficacy conditions. Analysis of simple effects indicate that the number of cognitive responses is significantly greater for the lower ($M = 2.39$) than for the higher efficacy condition ($M = 1.78$; $F(1,92) = 3.52$, $p < .05$, $\omega^2 = .04$).

Persuasion. ANOVA reveals a significant framing by efficacy interaction on attitudes ($F(1,90) = 2.72$, $p < .05$, $\omega^2 = .03$) and intentions to follow the recommendations ($F(1,90) = 2.42$, $p < .06$, $\omega^2 = .03$). There was also a significant efficacy main effect on intentions to follow the recommendations ($F(1,90) = 9.54$, $p < .05$, $\omega^2 = .10$). Intentions were greater in the lower efficacy condition than in the higher efficacy condition. Table 1 presents means and standard deviations.

As predicted in H_{2a} , in the lower efficacy condition, attitudes and intentions to follow the recommended behavior are higher for negatively framed messages than for positive-

ly framed messages—for attitudes, $F(1,90) = 2.76$, $p < .05$, $\omega^2 = .09$; for intentions, $F(1,90) = 3.03$, $p < .05$, $\omega^2 = .10$. Our results for the higher efficacy condition are more consistent with Gleicher and Petty (1992) and Rothman and colleagues (1993) than with Maheswaran and Meyers-Levy (1990). Attitudes and intentions to follow the recommended behavior are not significantly different for positively framed messages than for negatively framed messages (p 's $> .10$), and are discussed in the subsequent section.

Tests of Mediation. We used Baron and Kenny's (1986) procedure to test whether extent of processing mediates the effect of efficacy on persuasion (attitudes and intentions). Baron and Kenny suggest three separate regressions for testing mediating effects: (1) the effect of efficacy on cognitions, (2) the effect of efficacy on persuasion, and (3) the effect of efficacy and cognitions on persuasion. We obtain support for mediation if the coefficients for efficacy in the first two equations and the coefficient for cognitions in the third equation are significant, and if the effect of efficacy on persuasion is less in the third equation than the second. Results of the procedure support the role of cognitions as a partial mediator on persuasion (regression 1: $F(1,91) = 2.89$, $p < .05$, $\omega^2 = .03$; regression 2: $F(1,91) = 5.76$, $p < .01$, $\omega^2 = .14$; regression 3: $F(2,90) = 2.56$, $p < .05$, $\omega^2 = .02$ for cognitions; $F(2,90) = 4.41$, $p < .05$, $\omega^2 = .12$ for efficacy).

Other experimental measures. We performed factor analyses on all measures that consisted of three or more items. Because results indicate that all the items load on one factor for each measure with reasonably reliable scales (fear, $\alpha = .87$; severity, $\alpha = .83$; credibility, $\alpha = .69$), we averaged these items to form one index of fear, severity, and credibility, respectively.

No differences in fear, perceived severity, or perceived susceptibility were anticipated. ANOVAs confirm that subjects' level of fear, perceived severity, the probability of their getting HPV, and their perceived vulnerability were not different across conditions (p 's $> .10$) with the exception of a marginally significant main effect of framing on severity ($F(1,90) = 2.21$, $p < .07$, $\omega^2 = .03$). Similarly, the credibility of the pamphlets, the informativeness of the pamphlets, and the ease of comprehension did not differ across efficacy and framing conditions (p 's $> .10$).

We performed ANCOVAs on the dependent measures with prior knowledge, previous sexual behavior, if they, their current or previous partners, or any friends have ever been diagnosed with HPV, if they were ever tested for HPV, and if testing for STDs is part of their routine physical as covariates. Results show that none of these covariates reach significance (p 's $> .10$).

A main effect of sex on attitude was obtained; men indicated the pamphlet was more useful ($M = 5.65$) than women ($M = 5.31$, $F(1,93) = 2.64$, $p < .06$, $\omega^2 = .03$). We believe this was an artifact of the topic chosen. One of the recommendations was to use latex condoms for safer sex, and condoms have historically been considered a man's product for birth control and protection from disease (Solomon and DeJong 1986).² Although gender differences are likely to be poten-

²Consistent with this view, a study on gender responses to condom advertisements found that men had a more favorable attitude toward the advertisement than did women (Struckman-Johnson et al. 1990).

Table 2
MEANS AND STANDARD DEVIATIONS FOR THE EFFECTS OF
MESSAGE FRAMING AND EFFICACY ON PERSUASION:
STUDY 2

	Low Efficacy Frame		High Efficacy Frame	
	Negative	Positive	Negative	Positive
Behavioral Intentions	3.35 ^a (1.00) ^b	2.77 (1.24)	3.41 (1.21)	3.81 (1.26)
Attitude	6.28 (.80)	5.81 (1.27)	5.94 (1.13)	6.30 (1.00)
n	26	31	29	29

^aTreatment means

^bStandard deviation

tial mediators in health-related studies, because gender is not the focus of this study, and does not interact with framing and efficacy, we do not discuss its implications here.

Discussion

Study 1 looked at the effects of perceived efficacy and message framing on intentions to perform a health-related behavior. Results support the contention that the extent to which people process a health-related message varies as a function of the perceived efficacy of the message. In the case of low perceived efficacy, when performance of the recommendations is uncertain to lead to the desired outcome, people are forced to evaluate the tradeoffs of compliance versus noncompliance and, therefore, engage in effortful processing of the message. Analysis of cognitive responses provided during an open-ended elaboration task confirms H₁: a greater extent of message processing occurs under conditions of lower perceived efficacy. Consequently, negative frames are more effective than positive frames, which confirms H_{2a}.

Persuasion under conditions of higher perceived efficacy (less effortful processing) was more exploratory. Previous studies found mixed support for the influence of framing on persuasion; Maheswaran and Meyers-Levy (1990) found that positively framed messages were more favorable than negatively framed messages, whereas Gleicher and Petty (1992) and Rothman and colleagues (1993) found that positively and negatively framed messages were equally favorable. Results from our study are consistent with those of Gleicher and Petty and Rothman and colleagues, because we found attitudes and behavioral intentions toward the recommendation equally favorable for both positively framed and negatively messages.

There are several differences among these studies, but two possible explanations deserve further investigation. First, in the Maheswaran and Meyers-Levy (1990) study, depth of processing was varied by manipulating individual involvement, whereas the Gleicher and Petty (1992) study, the Rothman and colleagues (1993) study, and our study used the message to vary depth of processing. A second difference among these studies is the level of motivation generated by the context. In the Gleicher and Petty (1992), the Rothman and colleagues (1993), and our study, the topic

chosen (crime watch, skin cancer, and HPV, respectively) is very relevant to the student population. Thus, the low motivation condition that increased the effectiveness of positive framing over negative framing in the Maheswaran and Meyers-Levy study may not have been present here or in the studies performed by Gleicher and Petty and Rothman and colleagues.

STUDY 2

Study 1 provides evidence of a framing by efficacy interaction: in the low efficacy condition, negative frames are more persuasive than positive frames, whereas in the high efficacy condition, positive and negative frames are equally persuasive. The purpose of Study 2 is to replicate the results in Study 1 using a different operationalization of efficacy and a different health issue, skin cancer. We chose skin cancer for a number of reasons. First, skin cancer is a highly salient problem today. The increase in malignant melanoma exceeds that of any other cancer (except lung cancer in women) (Goldsmith 1987). Skin cancer is also relevant to all groups, especially students who make a well developed tan a priority (Miller et al. 1990). Most importantly, skin cancer is in large part under a person's control: a person who takes proper precautions can greatly reduce the chance of getting it.

We chose a variable to manipulate efficacy on the basis of providing an extension of the Meyerowitz and Chaiken (1987) study. Previously, we speculated about whether the Meyerowitz and Chaiken (1987) study and the Rothman and colleagues' study (1993) on detection of cancer created a condition of low efficacy and, thus, in-depth message processing. To examine the relationships between levels of efficacy and depth of processing, and levels of efficacy and framing, we varied efficacy by using two different behaviors: *detection* versus *prevention* of skin cancer. The former behavior recommends a cancer self-examination to detect the presence of skin cancer on the body; the latter recommends behaviors to prevent skin cancer. The framing manipulation is identical to that used in Study 1: the message stresses either the positive or negative consequences of (non) compliance with the recommendations. As in Study 1, we expect that in the low efficacy condition, negatively framed messages will result in more persuasion than positively framed messages because subjects will be motivated to engage in more in-depth message processing. These framing effects should disappear in the high efficacy condition when subjects are not motivated to process the message in-depth.

Method

We ran Study 2 as a full factorial between-subject with two levels of efficacy (low versus high) and two levels of framing (positive versus negative). We asked one hundred and fifteen graduate and undergraduate students to read a brochure on skin cancer. After spending as much time as they liked reading the brochure, participants completed a questionnaire, received their compensation (\$5), and were thanked and debriefed.

We designed the brochure, *Facts On Skin Cancer*, to resemble actual brochures disseminated by the American Can-

cer Society and other health organizations. Page one of the brochure contained facts on skin cancer (e.g., "Every year, about 450,000 Americans are diagnosed with skin cancer"). Pages two and three provided information on the consequences and warning signs of skin cancer (e.g., "An open sore that bleeds, oozes or crusts and remains open for three or more weeks."), and pages four and five contained the recommended behavior that is discussed subsequently.

Framing. We manipulated positive versus negative framing, as in Study 1, by altering the recommendation section of the pamphlet. Negative framed modifications are bracketed in the subsequent example.

By [not] using a sunscreen with a Sun Protection Factor (SPF) of 15 or greater, and [not] wearing wide-brimmed hats and protective clothing as much as possible, you will [not] avoid ultraviolet rays.

Efficacy. The efficacy manipulation follows the Rothman and colleagues (1993) study, in which two different skin cancer scenarios were created. The high efficacy scenario presented prevention recommendations that substantially reduced the threat of skin cancer; the low efficacy scenario presented detection recommendations that less substantially reduced the threat.

Half of the subjects were given recommendations to perform a cancer self-examination to detect the presence of skin cancer on the body (e.g., "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."). This detection technique is appropriate to represent the low efficacy condition for a variety of reasons (cf. Meyerowitz and Chaiken 1987). Performing a self-examination is a behavior with inherent uncertainties because of the large number of outcomes that any examination may reveal: (1) finding cancerous tissue, (2) not finding cancerous tissue and truly not having skin cancer, (3) not finding cancerous tissue, yet actually having skin cancer, and (4) finding tissue that looks cancerous but actually is not. Reasons for not performing a cancer self-examination include lack of skill in performing it and lack of confidence in the technique (Meyerowitz and Chaiken 1987). Of course, performing the self-examination does not change an individual's likelihood of having skin cancer, it only aids in early detection and, therefore, early treatment. A cancer detection self-examination is also of equal importance and relevance to men and women of all ages.

The pamphlet gave subjects in the high efficacy condition recommendations to perform behaviors to prevent skin cancer (e.g., "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"). Because of the widespread acceptance of these products, there is reason to believe that the prevention techniques listed in the brochure will be viewed as highly efficacious (American Cancer Society 1988).

Before designing the pamphlets, we conducted a pretest to verify the relative uncertainties of the low and high efficacy behaviors. Fifty-seven undergraduate students rated their level of agreement (1 = disagree, 7 = agree) with the statement that the recommendations are risky because, even

if they performed them, the recommendations would not be certain to lead to the desired outcome. Results confirm that the low efficacy behavior is perceived to be much more risky ($M = 5.09$, $s.d. = 1.47$) than the high efficacy behavior ($M = 3.48$, $s.d. = 1.49$; $F(1,56) = 16.86$, $p < .001$, $\omega^2 = .23$).

Experimental Measures

With a few exceptions, the procedure and questionnaire followed the one described for Study 1; only the modifications are addressed here. We adapted the attitude measure from Meyerowitz and Chaiken (1987), whose study was performed in a similar context—the detection of breast cancer through a self-examination. Meyerowitz and Chaiken queried subjects on their beliefs about the drawbacks associated with the behavior. In our study, half the subjects read a brochure asking them to perform a monthly self-examination, whereas the other half were told to practice prevention procedures. Compliance with the former might be affected by a respondent's level of embarrassment about examining his or her own body. Compliance with the latter might involve some level of public or social embarrassment. Therefore, we measured attitude toward the recommendations by asking subjects to rate their agreement with (1) the recommendations are embarrassing and make them feel uncomfortable (these items were reverse scored for analysis) and (2) following the recommendations is worth their time. We measured knowledge of skin cancer a three-item scale (I know a lot about skin cancer, I know more about skin cancer than most people, and I know a lot about cancer in general; $\alpha = .86$) as part of the main questionnaire rather than as a pretest. Analyses using knowledge of skin cancer as an independent variable and a covariate show no influence on the effects of framing or efficacy on the dependent measures (p 's $> .10$). Thus, we are comfortable that the efficacy manipulation was not affected by different levels of knowledge with the material.

As in Study 1, we ascertained the extent of message processing by employing two independent coders (reliability = .86) to categorize cognitive responses. Disagreements were discussed and resolved by an independent third party. Examples of cognitive responses for each category are as follows: message-related cognitions, "I'm going to check for marks on my skin," and thoughts irrelevant to the message topic, "I'm hungry."

In addition, we modified the possible covariates on the last page of the questionnaire. Subjects indicated their sex, and their familiarity with warning signs, ways to prevent skin cancer, and American Cancer Society health brochures; they also noted whether they, or anyone in their family, had been diagnosed with skin cancer, and if they spent a great deal of time outdoors last summer.

Results

Manipulation checks. The manipulation check on perceived efficacy supports the assumption that the prevention behavior ($M = 5.96$, $s.d. = 1.34$) is more efficacious than the detection behavior ($M = 5.12$, $s.d. = 1.27$, $F(1,111) = 11.88$, $p < .001$, $\omega^2 = .10$).

The recognition test for the framing manipulation revealed that subjects correctly identified phrases appearing in

their pamphlet with respect to positive or negative framing. For example, subjects in the positive (negative) condition received points for correctly identifying positively (negatively) framed items and rejecting negatively (positively) framed items. Results indicate that those subjects in the positive condition had more correctly recognized phrases ($M = 3.65$, $s.d. = 1.56$) than incorrectly recognized phrases ($M = .85$, $s.d. = .97$; $t(1,59) = 9.82$, $p < .001$); similarly, subjects exposed to the negative condition had more correctly recognized phrases ($M = 2.60$, $s.d. = 1.46$) than incorrectly recognized phrases ($M = 1.85$, $s.d. = 1.39$; $t(1,54) = 2.18$, $p < .05$).

Message processing. Results provide support for H_1 ; the number of cognitive responses indicate that, as expected, cognitive responses are significantly greater for the lower ($M = 4.51$) than for the higher efficacy condition ($M = 3.09$; $F(1,113) = 10.29$, $p < .001$, $\omega^2 = .08$).

Persuasion. Consistent with the hypotheses of Study 1, ANOVA reveals a significant framing by efficacy interaction on attitudes ($F(1,111) = 4.29$, $p < .05$, $\omega^2 = .04$) and intentions to follow the recommended behavior ($F(1,111) = 4.75$, $p < .05$, $\omega^2 = .04$). Results confirm H_{2a} : in the lower efficacy condition, attitudes and intentions to follow the recommendations are higher for the negatively framed than for the positively framed brochure (for attitudes, $F(1,111) = 2.77$, $p < .05$, $\omega^2 = .05$; for intentions, $F(1,111) = 3.27$, $p < .05$, $\omega^2 = .06$). Consistent with Study 1, for subjects exposed to the higher efficacy condition (H_{2b}), the positive and negative messages were equally favorable (p 's $> .10$, see Table 2).

There was also a significant efficacy main effect on intentions $F(1,111) = 6.16$, $p < .01$, $\omega^2 = .05$. In contrast to Study 1, higher efficacy resulted in greater intentions to follow the recommended behavior than lower efficacy. Previous research on PMT identifies factors that might moderate the main effect of perceived efficacy on persuasion. Subsequently, we identify these factors as possible explanations for the varying effects of efficacy on persuasion.

Tests of mediation. Results indicate that cognitive responses partially mediate the effects of efficacy on persuasion. Coefficients for the first two regressions suggested by Baron and Kenny (1986) are significant: Cognitions regressed on efficacy, $F(1,113) = 10.24$, $p < .001$, $\omega^2 = .08$; persuasion regressed on efficacy, $F(1,113) = 4.41$, $p < .05$, $\omega^2 = .04$. In the third equation, the effect of cognitions on persuasion is significant— $F(2,112) = 2.89$, $p < .05$, $\omega^2 = .03$ —whereas the effect of efficacy decreases compared to the second equation— $F(2,112) = 2.25$, $p < .10$, $\omega^2 = .02$.

Other experimental measures. Consistent with Study 1, subjects' level of fear ($\alpha = .89$), perceived severity ($\alpha = .83$), the probability of their getting skin cancer, and their perceived vulnerability did not differ among conditions (p 's $> .10$), excepting a main effect of vulnerability such that subjects in the higher efficacy condition ($M = 4.63$, $s.d. = 1.60$) felt more vulnerable than those in the lower efficacy condition ($M = 4.07$, $s.d. = 1.66$, $F(1,111) = 3.31$, $p < .05$, $\omega^2 = .03$). In addition, the credibility of the pamphlets ($\alpha = .63$), the informativeness of the pamphlets, and the ease of comprehension did not differ across conditions (p 's $> .10$).

We performed ANCOVAs on the dependent measures with sex, knowledge of skin cancer, and familiarity with the

warning signs, ways to prevent skin cancer, and American Cancer Society health brochures. We also performed ANCOVAs on whether they or anyone in the family had ever been diagnosed with skin cancer, if they spent a great deal of time outdoors last summer, and their ability to imagine as covariates. Results show that none of these covariates reach significance (p 's $> .10$).

Discussion

Study 2 accomplishes two purposes. Given the same pattern of results found in Study 1, we infer that prevention versus detection can be used to manipulate perceived efficacy in the same way as numerical values of chance. This manipulation reflects a more natural occurrence of efficacy in health communications. Furthermore, Study 2 both supports and extends the effects found in previous studies by Meyerowitz and Chaiken (1987) and Rothman and colleagues (1993), whose findings suggest that women who read a pamphlet with arguments framed in negative/loss language had more positive attitudes, intentions, and behaviors toward cancer self-examination than women who read a pamphlet with arguments framed in positive/gain language. Moreover, Meyerowitz and Chaiken and Rothman and colleagues suggest that cancer self-examination is a risky (lower efficacy) behavior and interpret their findings from a decision making framework, arguing that people are willing to engage in risky behavior to avoid losses (Kahneman and Tversky 1979). Unfortunately, Meyerowitz and Chaiken report neither a measure of the extent to which subjects perceived a self-examination to be risky, nor any cognitive response measures to shed insight into the extent to which subjects processed the self-examination pamphlet. Similarly, Rothman and colleagues suggest that cancer prevention behavior is a less risky (higher efficacy) behavior but do not report a measure of this nor any cognitive response measures.

Our study suggests that detection is perceived as being lower on the efficacy dimension, and prevention is perceived as higher in efficacy. Furthermore, lower efficacy motivates more in-depth processing, whereas higher efficacy evokes less effortful processing. Thus, we demonstrate that processing effort is a significant factor in the process underlying the framing effect found in the Meyerowitz and Chaiken and Rothman and colleagues studies.

GENERAL DISCUSSION

Our study tests the relationships between perceived efficacy and depth of processing, and perceived efficacy and message framing. We demonstrate that less certain conditions motivate more in-depth processing; we then show that for in-depth processing, negative frames are more persuasive than positive frames. In contrast, for higher efficacy conditions, message framing is less important because a person undertakes less processing for messages with more certain behaviors.

The results provide an important contribution to public service campaign planners who advocate changes in behaviors commonly perceived as either highly efficacious (e.g., immunization programs, nicotine patches for smoking reduction) or less efficacious (e.g., stress reduction tech-

niques, diet modifications). Research devoted to making these messages more effective provides an important service to profit and non-profit organizations involved in these and related issues. Our study suggests that designers of public service campaigns for which the recommended behavior is relatively uncertain or contains elements of high risk should use negative frames to motivate preventive action. For example, advertisements encouraging HIV testing advocate a behavior with inherent uncertainties in the outcome. Our results suggest that such advertisements would evoke in-depth processing and careful evaluation of the tradeoffs in deciding to comply and would be more effective if framed in the negative.

Our findings provide useful insights to marketing researchers studying health-related communications. Our study specifies the process underlying the effect of efficacy on persuasion. Our results provide direct support that message processing mediates the effect of efficacy on persuasion. Thus, future studies that use depth of processing to inform hypotheses about behavioral compliance can manipulate processing via varying levels of message efficacy.

Previous studies have indicated either a positive or negative effect of efficacy on persuasion (Mulilil and Lippa 1990). In contrast, our studies on efficacy and behavioral intentions support the view that the relationship between efficacy and persuasion may be contingent on perceived level of confidence. In Study 1, we find a main effect of efficacy on behavioral intentions; lower efficacy leads to greater intentions than higher efficacy. Although it is generally accepted that higher efficacy is more persuasive than lower efficacy, there have been a few exceptions. For example, Mulilil and Lippa (1990) provided California homeowners with messages persuading them to prepare for potential earthquakes. Similar to our study, Mulilil and Lippa found that the lower efficacy message was more persuasive than the higher efficacy message. They suggest that the higher efficacy message may have caused California homeowners to become overly confident in their ability to minimize earthquake damage, thereby reducing their perceived need to prepare in advance. Extending this logic to our study, it may be the case that the higher efficacy message results in subjects' overconfidence in their ability to prevent the disease, which then results in a decrease in subjects' perceived need to have regular STD testing and always practice safe sex.

In contrast, in Study 2 we find the opposite effect of perceived efficacy on behavioral intentions; subjects in the higher efficacy condition have greater intentions to follow the recommendations than those in the lower efficacy condition. These findings are consistent with PMT. Efficacy of the recommendations typically facilitates intentions to cooperate (Chu 1966; Rogers and Mewborn 1976). This theorizing on the effects of confidence on perceived efficacy is similar to the cognitive reassurance theory (Gleicher and Petty 1992), which states that confident subjects may not need to evaluate carefully the message to find reassurance.

Other factors may determine when overconfidence occurs; for example, people may not be overconfident with respect to all high efficacy behaviors. Understanding the determinants of overconfidence and the conditions under which it occurs would add great value to studies of health-

related compliance. Further research should include measures of confidence and reassurance to address these issues.

One potential variable that might moderate the effect of efficacy on amount of processing is the cost of performing the recommended behavior. Consumers may compare the cost of the behavior to the benefits of adopting the behavior as a basis for making their decision. The behaviors recommended in our study were relatively low cost (e.g., use sun screen, examine your skin, use a condom). For a high efficacy behavior with a low cost, the cost-benefit tradeoff requires relatively little decision making. A low efficacy behavior with a low cost would create more of a dilemma for the consumer, as the consumer evaluates whether the costs are worth the uncertain benefits. Thus, low efficacy behaviors lead to greater message processing than high efficacy behaviors for low cost decisions. However, when the costs of the behavior are high (e.g., quit smoking, start an exercise routine), the reverse may hold true. The cost-benefit tradeoff for a high cost, high efficacy behavior might be very difficult and lead to greater processing than the cost-benefit tradeoff for a high cost, low efficacy behavior. For example, if costs are high for a high efficacy behavior (e.g., quitting smoking), the tradeoff becomes difficult and more processing might occur. Consequently, it may be the difficulty of the cost-benefit tradeoff, or the level of cost-efficacy tradeoff, that may determine the extent of message processing. Further studies should compare high versus low cost behaviors to add insight on the relationship between efficacy and depth of processing.

Similar to previous studies on efficacy (Rothman et al. 1993), in our study two behaviors were used to manipulate detection versus prevention. These behaviors could differ on several dimensions (e.g., rituals involved in performing these behaviors, prior adoption, frequency of use). For example, prior users, as compared to non-users, may perceive the recommended behavior as more socially acceptable, or easier to adopt. Further research should examine these potential differences to test for any confounding effects on the efficacy manipulation.

Our results also test the boundaries of PMT. Study 2 uncovered a main effect of perceived efficacy on vulnerability and a main effect of perceived efficacy on behavioral intentions, though vulnerability does not mediate behavioral intentions. Subjects in the higher efficacy condition reported feeling more vulnerable to the threat and had greater intentions to follow the recommendations than those in the lower efficacy condition. Our findings are consistent with PMT. Efficacy of the recommendations and higher levels of vulnerability typically facilitate intentions to cooperate (Chu 1966; Rogers and Mewborn 1976).

Our data indicate that perceived severity and susceptibility did not affect persuasion. Typically, studies on Protection Motivation that report systematic effects of severity and susceptibility manipulate these variables by varying levels of personal relevance or seriousness of consequences. (See Boster and Mongeau 1985 for a review.) In our study, severity and susceptibility were measured, not manipulated variables. In a study similar to ours in which severity and susceptibility were measured but not manipulated, Meyerowitz and Chaiken (1987) also find no differences across framing

conditions. Although we find a marginal main effect of framing on severity in Study 1, we do not place much emphasis on this result because this effect was not strong ($p < .10$), and no other framing effects were evident. We recommend that further studies examine the interaction between framing, severity, and susceptibility on both emotional and cognitive responses to public service messages.

Here, there are no formal predictions regarding the role of fear as either an emotional or cognitive response that influences perceived efficacy or framing. In both Study 1 and Study 2, fear did not differ among the four framing by efficacy conditions. This result is consistent with PMT, which identifies fear as a byproduct of the message but not an integral part of the persuasion model (Rogers 1983). Because our study does not vary the level of threat in the message, we cannot compare our results to those of the Ordered Protection Motivation Model proposed by Tanner, Hunt, and Eppright (1991), in which level of threat provides the impetus for evaluating coping responses. A more meaningful comparison of our results to Tanner, Hunt, and Eppright would require an examination of levels of threat, framing, and efficacy.

Results of our study also extend the literature on prospect theory, which postulates that people are more willing to choose an uncertain outcome when it is framed as a loss rather than as a gain (Kahneman and Tversky 1979). Our message framing manipulation differs from the framing manipulation used in prospect theory. In prospect theory, outcomes are perceived as positive or negative on the basis of their relation to a neutral reference point. Although the framing manipulations in prospect theory entail objectively equivalent frames, whereas studies on message framing rely more on positively versus negatively framed language, this study demonstrates that prospect theory applies to personal health behaviors, as well as to situations more likened to real life. Studies on prospect theory have typically employed forced-choice scenarios in which subjects chose a monetary gamble. Even the prospect theory studies in the domain of health-related behaviors employ relatively artificial forced-choice scenarios on abstract, impersonal choices (e.g., Asian flu). Here, we did not force subjects to choose anything; we merely presented them with an informational brochure. Neither did we show them both a certain and a risky option, nor did we ask them to make a decision. Thus, our study extends the boundaries of prospect theory by supporting it in a more natural context.

In our study, individual differences, such as prior knowledge of HPV or skin cancer, did not impact processing effort or persuasion. However, additional measures that affect confidence, such as expectancy-disconfirmation manipulations (Maheswaran and Chaiken 1991) or self-esteem (Campbell 1986), might have systematic effects on processing and persuasion. Further research should focus on additional individual and situational variables that could motivate processing effort by increasing desired confidence or undermining actual confidence thresholds.

Additional studies on health communications can extend this research by testing the effectiveness of several message factors typically used in health communications in quasi-experimental studies. One limitation of our study is that the

laboratory setting might have created an artificially high level of attention. Field tests may use more naturally stimulating message factors, for example, pictures or other image provoking information. Similarly, altering the referents (self versus other) could influence the level of attention, particularly for a behavior like drinking and driving, in which non-compliance could injure others. Studying these and other message factors in quasi-experimental designs would be useful in planning effective health campaigns.

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