

REGULATORY FOCUS AND RELIANCE ON RESPONSE
EFFICACY AND SELF-EFFICACY IN HEALTH
ATTITUDE CHANGE

DISSERTATION

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By

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ABSTRACT

Changing beliefs about response efficacy and enhancing self-efficacy are critical components of persuasive messages designed to change health behavior. This dissertation examines how match versus mismatch between information targeting efficacy beliefs and temporarily primed regulatory focus affects the level of message elaboration, persuasion, and attitude strength.

Individuals' promotion or prevention focus was temporarily made salient by framing a behavioral change as health promotion or disease prevention. A match (mismatch) is defined as a fit (misfit) between the focus of the persuasive appeal and the frame of the message. The effects on persuasion of two matched conditions, response efficacy focus with prevention frame and self-efficacy focus with promotion frame, and two mismatched conditions, response efficacy focus with promotion frame and self-efficacy focus with prevention frame, are examined.

In study 1, participants read persuasive messages with introductory frames that were either matched or mismatched with the type of efficacy information in the body of the message. Strong and weak versions of the same message were created to help detect the extent of cognitive elaboration as a consequence of matching message frame and message efficacy focus. Following the persuasive messages, participants listed cognitive responses, completed attitude measures, and the need for cognition scale. Results indicate that participants discriminated more between

strong and weak response efficacy focused messages and less between the strong and weak self-efficacy focused messages.

Study 2 used a pre-post experimental design with random assignments of subjects to matching conditions as those in study 1. Participants' actual flossing behavior was measured one week after the persuasion. The data indicate a significant increase in flossing behavior as a result of the intervention. The results also suggest that matching message regulatory frame with message efficacy focus leads to more extensive message related cognitive elaboration, especially in the form of counter argumentation. In addition, attitude becomes stronger structurally when message frame matches rather than mismatches with supporting efficacy information.

The findings indicate that regulatory frame and efficacy focus matching need not always increase persuasion, but it may increase the structural strength of the attitude.

Dedicated to The Memory of My Father

Chuancheng Liu

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CHAPTER 1

INTRODUCTION

Expectations about whether an action will bring about a desirable or undesirable outcome and whether one has the ability to take action are often on a person's mind when that person decides whether to initiate a behavioral change. These two dimensions, outcome expectancy and self-efficacy (Bandura, 1977) have been extensively studied in the health behavioral change literature (where response efficacy is often used instead of outcome efficacy).

According to Bandura's social cognitive theory (1977), outcome expectancy is the belief or subjective probability that a required action will lead to some consequences. Individuals are motivated to perform behaviors that they believe will produce desired outcomes. Self-efficacy, on the other hand, is concerned with people's beliefs in their own capabilities to exercise control over their own functioning or events that affect their lives. Overall, Bandura's theory emphasizes how changes in self-efficacy through social learning mediate behavioral change.

What is especially appealing about Bandura's social cognitive theory for health communication and social marketing is that both outcome expectancy and self-efficacy can be learned through social interaction, thus are open to influence of communication processes. For example, Bandura (1977) proposed that self-efficacy

can be changed by four types of self relevant information: a) performance accomplishments, which is based on personal mastery of experiences, b) vicarious experience from seeing others performing a behavior without aversive consequences, c) verbal persuasion, which leads people to believe that they can cope with what they have failed in the past, and d) emotional arousal, which may be informative about one's competence.

1.1 Response and Self-Efficacy in Health Communication

Bandura's theory had major influence on theories and practices of social marketing campaigns. In health communication, both response efficacy and self-efficacy are prominently featured in the health belief model (Rosenstock, Strecher, & Becker, 1988), protection motivation theory (Rogers, 1975), and extended parallel processing model of fear appeals (Witte, 1992).

According to the health belief model, people's readiness to act is affected by beliefs about the perceived susceptibility and perceived severity of a health risk, the perceived benefits and perceived barriers of taking action (response efficacy), factors and cues that activate action, and confidence in one's ability to take action (self-efficacy). Like the health belief model, protection motivation theory emphasizes the cognitive operations in people's decision process leading to adopting or rejecting a health enhancing behavior. In the original formulation of the model, four message features, probability of occurrence, magnitude of obnoxiousness, response efficacy depictions, and self-efficacy depictions are processed by the cognitive system and leads to perceived susceptibility, perceived severity, perceived response efficacy, and perceived self-efficacy. Perceived susceptibility and severity

form the basis of threat appraisal, whereas perceived response and self-efficacy form the basis of coping appraisal. These two appraisals are integrated and result in the intention to perform adaptive responses or maladaptive responses.

Rogers' original protection motivation (1975) is extended by Kim Witte (1992) to account for boomerang effect of fear appeal when perceived threat is high and perceived efficacy is low. Witte (1992) retains the basic elements of the message features and cognitive mediation components of the PMT model, but makes the following predictions of how and when people engage in adaptive danger control or maladaptive fear control. According to the extended parallel processing model, when people encounter a fear appeal message depicting the threat component (susceptibility and severity) and the efficacy component (response and self-efficacy), they first form an appraisal of the threat. If the perceived threat is medium or high, fear is elicited and people start to engage in efficacy appraisal. However if perceived threat is low, no fear is elicited and no efficacy appraisal is conducted.

When perceived threat and perceived efficacy are both high, people will initiate danger control, behaviors that will avert the threat. When the perceived threat is high but perceived efficacy is low, people are motivated to cope with the fear, instead of initiating behaviors to control the danger.

The importance of outcome and self-efficacy expectations goes beyond health communication models. Because expectancy is a central construct in psychology, both of these constructs are also included in more general models of attitude and behavior, such as the theory of reasoned action (Ajzen & Fishbein, 1980) and theory of planned behavior (Ajzen, 1991, TPB). In these models behavioral intention is a function of attitude toward behavior, which is based on expectancy value beliefs,

subjective norm, and in the case of TPB, subjective behavioral control, the belief that one has the ability to exercise control over the behavior.

Despite the great importance attached to response and self efficacy in all these models, there is little research on how and why individuals may differ in their sensitivity to and reliance on response or self-efficacy beliefs in their self-regulatory behavior. With few exceptions (Keller, 2006; Shah & Higgins, 1997), prior theories seem to be content with assertions that individuals differ in their self-efficacy beliefs and expectancies of outcome efficacy. The past research, however, has not been explicit regarding factors that may affect the strength of relationships between motivation and the two kinds of efficacy appraisals. Does the observed relationship between efficacy assessment and behavioral change differ by individual difference? Are some people more motivated to act in response to information that boosts their self-efficacy while others are more sensitive to information related to response efficacy, or the probability of action-outcome relationship? Is it possible that different message features may change the importance assigned to self-efficacy and response efficacy by an individual before behavioral change? If so, under what circumstances and how does it happen?

Answers to the above questions can be used to improve tailored communication design. Tailoring concerns matching information in a persuasive communication to specific needs and interests that an individual has regarding an attitude object (Kreuter, Farrel, Olevitch, & Brennan, 2000). It is “a process for creating individualized communication” (Rimer & Kreuter, 2006, p. 184). This process begins with a detailed analysis of individual level demographic, psychological, and behavioral data to identify discriminating factors that can be

effectively addressed in customized communications. Variations of messages reflecting the different dimensions of the discrimination factors are then produced and delivered to the intended audience. The increasing popularity of tailoring in health communication has been facilitated by the widespread use of information technologies in recent years and evidence that it is more effective than traditional mass communication (Noar, Benac, & Harris, 2007). The current research is however different from typical tailoring studies. Instead of searching for existing individual differences, it attempts to create a psychological state (regulatory focus) that can be differentially sensitive to information content (response efficacy and self-efficacy beliefs).

Based on previous research (Keller, 2006; Shah & Higgins, 1997; Pham & Avnet, 2004) on motivational differences in self-regulation toward personal ideals (focused on promotion) vs. obligations (focused on prevention), I examine whether a difference in response strength exists and if it is a function of salient regulatory focus. For individuals whose dominant concerns of self-regulation are to achieve personal ideals, I predict that their motivation to act increases faster when self-efficacy increases than when response efficacy increases. On the other hand, prevention focused individuals' motivation to act increases faster when response efficacy increases than when self-efficacy increases. Stated differently, it is predicted that the slope of the function between self-efficacy and motivational strength is different than the slope of the function between response efficacy and motivational strength; and the sign of the difference can be predicted and explained by individual difference in regulatory focus. The slope parameter between self-efficacy and motivation is larger than the parameter between response efficacy for promotion

focused individuals whereas the slope parameter between self-efficacy and motivation is smaller than the parameter between response efficacy for prevention focused individuals.

In what follows I will first review the basic elements of regulatory focus theory and then draw on existing research to substantiate the above prediction. I will then discuss implications of the aforementioned proposition for persuasion and the rationale for the present research. Specifically this research is designed to understand how individuals' regulatory focus (as temporarily induced by message regulatory frame) affects the quantity and nature of cognitive elaboration of message claims that target either response efficacy or self-efficacy beliefs.

1.2 Regulatory Focus

Regulatory focus theory (Higgins, 1997) is a theory about self-regulation, specifically the processes that a person uses to meet personal standards and achieve goals. This theory grows out of Higgins' earlier self-discrepancy theory (Higgins, Bond, Klein, & Strauman, 1986). In formulating regulatory focus theory, Higgins (1997) argues that self-regulation differs in two fundamental ways: some methods involve a promotion focus and others involve a prevention focus. Self-regulation involving different regulatory foci differ on a) the underlying motives, b) the nature of the standards and goals, c) salience of outcomes, and d) strategic means used to achieve the goals.

Self-regulation involving a promotion focus is motivated by nurturance, growth, and advancement needs. The goals and standards used in measuring progress reflect ideal self, dreams, and aspirations. When people are self-regulating

toward their goals with promotion focus, they are most sensitive to the presence or absence of gains and positive outcomes. In addition, promotion focused self-regulation is conducted by using approach and eager means.

Self-regulation involving a prevention focus is motivated by security and safety needs. The goals and standards used in measuring progress reflect ought self, duties, and responsibilities. When people are self-regulating toward their goals with prevention focus, they are most sensitive to the presence or absence of losses and negative outcomes. Finally prevention focused self-regulation is often achieved by using avoidance and vigilant means.

The following example illustrates the difference between promotion focused and prevention focused self-regulation. Two students in the same course are both striving to get an A out of the course. One student's long term goal is to get into a prestigious MBA program so that he can advance his professional achievement. The standard that is used to measure success is his ideal self. He is most sensitive to the presence or absence of positive outcomes that can help him narrow the discrepancy between his current self and ideal self. This person is eager to achieve his goal. He goes beyond the course requirements and read extra materials so that he does not miss any chances to achieve an A grade. This student is typical of people who are promotion focused. In the same class another student also wants to get into a prestigious MBA program, but he is focused on meeting all requirements necessary, including maintaining at least a 3.5 GPA. The standard of success is his ought self, which represents the duties and responsibilities that are important for a person's self concept. He is most sensitive to the presence or absence of negative outcomes that may prevent him from achieving his obligations. This person is vigilant in his goal

pursuit. He is careful about not missing deadlines and assignments, and he wants to be prepared on what is going to be covered in the exams. This student is typical of a person whose primary focus of self-regulation is prevention.

It is important to note that in this example, the two students are pursuing the same goal, to get an A grade in the class. However because they view the goal differently, the strategies that they use to achieve the goal also differ: one person views getting an A as an ideal and he uses eager means to maximize his chances of getting an A; the other person views getting an A as a responsibility and he uses vigilant means to minimize his chances of not getting an A. Thus the difference in behavior can not be attributed to differences in the goal itself; it is the difference in mental construal of the goal that drives these two individuals to pursue their goal in different ways.

People's health behavior involves a great deal of self-regulation (Bandura, 1991; Baumeister, 2004). Regulatory focus theory can potentially offer many new insights. Some people may think of their health behavior mostly in terms of achieving ideals, while others may think mostly in terms of responsibilities to keep fit. Such differences may also affect how people search and process health related information. This hypothesis was recently examined by Pham and Avnet (2004) in the context of consumer response to product advertising. Pham and Avnet (2004) reasoned that if promotion focus triggers more eager forms of exploration and prevention focus triggers more vigilant forms of exploration, then promotion focused individuals may be more likely to use heuristics and thus be more likely to rely on internal information in their judgment. In contrast, prevention focused individuals, however, may scrutinize the environment more carefully and rely more on external

information in their judgment. Indeed they showed that promotion focused participants relied more on subjective affect response (internal information) than prevention focused participants did, whereas prevention focused individuals relied more on substance contained in ads (external information) than promotion focused individuals did when they formed brand attitudes.

Regulatory focus may also affect how people rely on response efficacy and self-efficacy expectancy in their attitude formation and change, goal setting, and goal striving. If we agree that response efficacy is concerned with the relationship between a behavior and the likely consequences, which is external to the individual, then by extending Pham and Avnet (2004)'s hypothesis, I predict that prevention focused individuals may find response efficacy information to be of greater diagnostic value and be more important in helping them decide whether to initiate an action than promotion focused individuals do. Self-efficacy, on the other hand, is an assessment of one's ability to mobilize efforts to achieve an outcome. It is about one's own self in relation with the external environment and its strength depends more on internal factors than external factors, that is, it is more an internal assessment than an external assessment. Again, consistent with Pham and Avnet's hypothesis, I predict that promotion focused individuals may respond more positively to self-efficacy enhancing information than prevention focused individuals do.

In two studies, Keller (2006) provided general evidence that is consistent with the aforementioned prediction. Promotion focused individuals were assumed to be more concerned with whether the proposed action is an easy means to achieve the desired outcome and are less concerned with whether that means is the most

effective means available. In contrast, prevention focused individuals were assumed to be more concerned with the effectiveness rather than the easiness of a means leading to a desired outcome. Thus when a promotion focused individual encountered self-efficacy enhancing information and a prevention focused individual encounters response efficacy enhancing information, they each feel that there is a fit between their regulatory focus and the information. This fit experience leads to a more favorable attitude and intention to perform recommended health behavior.

Although Keller's data are largely consistent with the predicted effect of matching efficacy appeals with regulatory focus, at least two important issues remain to be examined. Exploration of these issues and their link to issues of attitude strength are important contributions of my dissertation. First, although Keller's data show that attitude is more favorable when efficacy appeals matches rather than mismatches regulatory focus, it is not clear what psychological processes underlie this effect. More specifically, it is unclear from the studies how people with primarily promotion focus vs. prevention focus process response efficacy or self-efficacy related information. The processes by which this influence takes place should have important implications for the ability of newly formed attitude and intentions to guide actual behavior (Haugtvedt & Kasmer, 2008).

Related to the above, Keller's data does not examine the qualitative differences in the attitude formed by matching efficacy beliefs and regulatory focus. Previous research suggests that although people may have attitude of the same extremity and valence as a result of persuasion, their attitude can differ significantly in terms of strength. Attitudes based on greater message elaboration tend to be more persistent over time, more resistant to counter attacks, and more predictive of

behavior than attitudes that are based on lesser degrees of elaboration (Haugtvedt & Kasmer, 2008; Petty, Haugtvedt, & Smith, 1995). In addition, strong and highly accessible attitudes are more predictive of behavior than weaker attitudes (Fazio, Powell, & Williams, 1989; Jones & Fazio, 2008). Thus, it is important to obtain a better understanding of the attitude change processes underlying the favorable attitudes developed in the matched conditions in regulatory focus research.

This research sheds light on the psychological processes by using message strength manipulations and cognitive response analysis (Greenwald, 1968). The research will also examine attitude strength differences in persistence and impact on actual behavior. This research is guided by the research methods employed in research related to the Elaboration Likelihood Model of persuasion (Petty & Cacioppo, 1986, ELM) and regulatory fit (Higgins, 2000).

1.3 Overview of Hypotheses

According to the Elaboration Likelihood Model of persuasion, any persuasion variable can potentially serve multiple roles for persuasion, depending on the baseline likelihood of elaboration. When elaboration likelihood is low (i.e. the recipient is not motivated or is distracted), a persuasion variable such as efficacy-regulatory focus matching can serve as a simple cue. When elaboration likelihood is moderate, matching can affect the amount of message elaboration. When elaboration likelihood is high, matching can serve as an argument for or against the advocated position, or bias the direction of message elaboration (cf. Petty and Cacioppo, 1986; Haugtvedt and Kasmer, 2008).

As an initial examination of the processes in efficacy-regulatory focus matching effects, the experiment in this proposal is designed to involve a situation that is of low to moderate level of baseline elaboration likelihood. The advocated behavioral change in the persuasion message in this dissertation is to floss teeth daily. Flossing is a behavior that most adults know it is good for dental health and they should floss daily, but the majority of adults rarely do.

Consistent with past persuasion research, differences in message elaboration will be assessed using two methods. The first one involves an argument quality manipulation, in which the central claim of the message is supported with strong or weak arguments. Individuals who elaborate more carefully on the message are more likely to distinguish between claims that are supported by strong vs. weak arguments. Thus if matching efficacy with regulatory focus increases objective message elaboration more than mismatching, or mismatching decreases message elaboration, then individuals in the matched conditions should be more likely to distinguish the strong vs. weak message than individuals in the mismatched conditions. As a consequence, individuals in matched conditions should have attitudes that are more favorable, more persistent, and more impactful on behavior when the message is supported with strong arguments, and have attitudes that are less favorable, less persistent, and less impactful when the message is supported with weak message than those in the mismatched conditions do.

A second method to examine differences in message elaboration is through cognitive response analysis. Immediately after participants read a message, they are asked to list all the thoughts that came to mind when they were reading the message. Individuals who elaborate on the message more should be able to list more

cognitive responses than those who elaborate less. In addition, when cognitive elaboration is high, the cognitive responses should also reflect the quality of the message in that those who read the strong argument message should be able to list more positive thoughts consistent with the advocated position, whereas those who read the weak message should generate more negative thoughts. Finally, under high elaboration, individuals' attitude should be mediated by the amount and valence of cognitive response, whereas under low elaboration, individuals' attitude may not be mediated by the cognitive response. This suggests that, if matching increases message elaboration more than mismatching does or mismatching decreases message elaboration, individuals in the matched conditions should list more positive thoughts when the message is strong and more negative thoughts when the message is weak than individuals in mismatched conditions do. In addition, individuals' attitude in the matched conditions should be more likely to be mediated by their cognitive responses than the attitude of individuals who are in the mismatched conditions.

In sum, I propose the following set of hypotheses that are consistent with the elaboration likelihood model of persuasion, and are based on the proposition that under relatively low to moderate baseline cognitive elaboration, matching efficacy frame with regulatory focus increases message elaboration whereas mismatching does not increase or may even decrease message elaboration.

- Attitude hypothesis: The difference between the attitude of those who read the strong message and the attitude of those who read the weak message is larger (smaller) when the efficacy claims fit (misfit) individuals' regulatory focus. This amounts to a three way interaction among regulatory focus, efficacy claim, and argument strength.

- Number of cognitive response hypothesis: Individuals generate more (fewer) relevant cognitive responses when the efficacy claims fit (misfit) their regulatory focus. This is a two way interaction between regulatory focus and efficacy claim.
- Valence of cognitive response: participants generate more (fewer) relevant positive responses when the efficacy claims are supported with strong (weak) arguments. This difference is larger (smaller) when the efficacy claims fit (misfit) participant's regulatory focus. This is also three way interaction between regulatory focus, efficacy claim, and argument strength.
- Cognitive response as mediator hypothesis: participants' attitude are more (less) correlated with their cognitive response when the efficacy claims fit (misfit) with their regulatory focus.
- Attitude-persistence hypothesis: participants' attitude decays less (more) over time when the message efficacy claim matches (mismatches) with the message regulatory focus, given the initial message is strong.
- Attitude-behavior relation hypothesis: participants' behavioral intention is more (less) predicative of actual when the message efficacy claim matches (mismatches) with the message regulatory focus, given the initial message is strong.

The efficacy-regulatory focus matching effect reported in previous literature may also be attributed to the 'feeling right' experience due to regulatory fit (Higgins, 2000). Regulatory fit happens when strategies, behaviors, or cognitions

sustain or fit one's current phenomenological state, such as mind-set and regulatory focus. When people experience regulatory fit, they feel right about what they do. This 'feeling right' experience can be mis-attributed to the value of the goal itself. In the case examined in this dissertation, a self-efficacy message (i.e., you can do it) may fit better with the regulatory focus of a promotion oriented individual (i.e., approaching goals with eager means) than it fits with that of a prevention oriented individual (i.e., vigilantly avoiding mismatches to goal attainment). However a response efficacy message (i.e., yes, it works) may fit better with the regulatory focus of a prevention oriented individual than a promotion oriented individual. Because this feeling right experience is directly transferred to the attitude object, unless it is disrupted, individuals will not be aware of its influence and will not try to correct for it. This possibility is confirmed in Cesario, Grant, and Higgins (Cesario, Grant, & Higgins, 2004, experiment 3).

Another consequence of regulatory fit is processing fluency experience. Fluency is the meta-cognitive experience of ease or difficulty associated with a mental task. Previous research suggests that subjective experience of ease or difficulty of information processing can give rise to positive or negative affect, which may be infused with the affect response to the focal object (Lee & Labroo, 2004; Reber, Winkielman, & Schwarz, 1998). It may be that promotion focused individuals, because of their elevated level of approach tendency, find a message that tells them that they have the ability to move and achieve a goal easier to process. This subjective experience of ease of processing may be mis-attributed to preference for the advocated behavior change.

Lee and Aaker (2004) provided evidence for the processing fluency account of regulatory fit on persuasion in gain/loss framing effect. Using only strong arguments in all their messages, they found that when there is a fit between regulatory focus and message frame (promotion focus matched with gain frame, and prevention focus matched with loss frame), participants found the message to be easier to process and understand, and were more successful in a perceptual identification task using words from the messages. In addition, the authors found that although participants generated more support reasons in the fit conditions, it is the perceived message effectiveness, not the number of support reasons that mediated the effect.

In another study that involved direct manipulation of argument strength, Aaker and Lee (2001) found that when independent self views (i.e., I and myself) is paired with promotion focus and interdependent self views is paired with prevention focus (i.e., we and us), participants were more discerning regarding argument strength.

In sum, theory and evidence involving regulatory fit experience ('feeling right' and processing fluency) on persuasion suggest that when there is a fit between regulatory focus and goal pursuit strategies, individuals are more likely to distinguish between strong and weak arguments and generate more positive thoughts than when there is a misfit. There are no major differences in these predictions between an elaboration likelihood account and a regulatory fit account of the effect when looking only at attitude extremity. The main difference between these two accounts centers on the mediator of the observed effect: the elaboration likelihood model suggests that the number and proportion of positive cognitive responses is the mediator, whereas the regulatory fit account suggests that the effect

is independent of cognitive response and it is the transfer of value experience (feeling right or fluency) that mediates the effect. To test the hypotheses and get answers to the question on mediators, two studies were conducted and reported here.

1.4 Gain/Loss Framing

The current investigation is closely related to but different from gains vs. losses framing or positive vs. negative framing of persuasion.

Framing of decisions as gains versus losses has a significant and predictable impact on choices (Tversky & Kahneman, 1981). In one of the most well-known demonstrations of framing effects, Tversky and Kahneman asked subjects to choose between two programs (A and B) that could mitigate the mortality rates of an unusual Asian disease, which is expected to kill 600 people. In one scenario, subjects were told that if Program A is adopted, 200 people will be saved. If Program B is adopted, there is a one-third chance that all 600 people will be saved and two-thirds chance that no one will be saved. In another scenario, subjects were told that if Program A is adopted, 400 people will die. If Program B is adopted, there is a one-third chance that nobody will die and two-thirds chance that all 600 people will die. The expected outcomes of choosing either Program A or Program B is identical in both scenarios except that the outcome is framed in terms of lives saved in the first scenario and in terms of lives lost in the second scenario. The majority of participants in Tversky and Kahneman's studies chose Program A under the first scenario, which suggests that they are risk averse, and the majority choose Program B under the second scenario, which suggests that they are risk seeking. This reversal of preference is apparently due to nothing more than framing of the decision

outcome as gains vs. losses. That is, people tend to show risk aversion in the domain of gains and risk seeking in the domain of losses.

Three types of framing have been identified (Levin, Schneider, & Gaeth, 1998). The first type is the typical risky choice framed as gains versus losses, such as the Asian disease problem studied by Kahnman and Tversky. Another type of framing is called attribute framing. For example, the same beef can be labeled as 90% lean or 10% fat, or the same medical procedure can be described as with 99% success rate or 1% failure rate. The third type of framing is goal framing which is the type of framing that is most often studied in persuasion. In goal framing, the positive outcome associated with complying with a recommended behavior or the negative outcome associated with not complying with a recommended are highlighted. The positive frame focuses on obtaining the positive outcome and the negative frame focuses on avoiding the negative outcome.

A well known example of goal framing is reported in Meyerowitz and Chaiken (1987) in which they showed that women were more likely to engage in breast self examination when presented with a persuasion message stressing the negative consequences of not engaging in breast self examination (e.g. decreased chance of identifying a tumor early) than when presented with a message stressing the positive benefit of engaging in breast self examination (e.g. increased chance of identifying a tumor early).

Psychologically gain/loss message framing may prime different regulatory focus. Looking from the end of the consequences of behavior, we can see that a message which focuses on the positive outcome can be framed as ‘if you do A, then you obtain a positive P’ or ‘if you don’t do A, then you will not get the positive P.’

Here the focus is on the positive outcome, but the connection between behavior and outcome is either framed as obtaining a positive outcome (gain frame) or as missing a positive outcome (loss frame). This kind of framing has clear a promotion focus. Similarly a message that focuses on the negative outcome can be framed as ‘if you do B, then you get a negative N’ or ‘if you don’t do B, then will not get the negative N.’ Here outcome focus is negative, but the connection between behavior and outcome is framed either as obtaining a negative outcome (loss frame) or avoiding a negative outcome (gain frame). This way of framing involves a prevention focus.

So a gain message can focus on attaining positive outcomes (gain) or avoiding negative outcomes (nonloss). A loss message can focus on attaining negative outcomes (loss) or not attaining positive outcomes (nongain).

Dozens of goal framing studies have been published to date, with varying degrees of success in demonstrating the existence and direction of the effect. A recent meta-analysis by O’Keefe and Jensen (O’Keefe & Jensen, 2006) on 165 effects estimated from about 50,000 participants showed no consistent overall advantage of gain or loss frames on persuasion. However two lines of research seem to suggest that the effectiveness of gain versus loss frames may depend on whether the targeted audience is under promotion or prevention focus (Lee & Aaker, 2004; Cesario et al., 2004) and whether the recommended behavior focuses on disease prevention or disease detection (Rothman & Salovey, 1997).

Regulatory focus theory predicts that promotion focused people are sensitive to the presence and absence of positive outcomes (gain and nongain) while prevention focused people are more sensitive to the presence or absence of negative outcomes (loss and nonloss). This suggests that gain frame messages focusing on

attaining positive outcome should be more persuasive to promotion focused individuals than loss frame messages, and loss framed messages should be more persuasive to prevention focused individuals than gain framed messages. These predictions were confirmed in several studies (Lee & Aaker, 2004; Cesario et al., 2004).

Rothman and Salovey (1997) derived a prediction from Prospect Theory that loss frame message should be more effective in encouraging disease detection behavior (e.g., mammogram, HIV testing), whereas gain frame message should be more effective in encouraging disease prevention behavior (e.g., sunscreen use, dieting). A program of research by them has repeatedly confirmed this prediction. Their original reliance on Prospect Theory to explain the empirical regularity has not been convincing (O’Keefe & Jensen, 2006). Recently they have reinterpreted some of their findings in terms of differences in regulatory focus (Rothman, Bartels, Wlaschin, & Salovey, 2006). It is argued that disease detection such as HIV testing may involve more of a prevention focus whereas prevention behavior such as sunscreen use may involve more of a promotion focus. Thus loss framed messages are more effective in persuading disease detection behavior, but gain framed messages are more effective in persuading disease prevention behavior.

In the current research a promotion framed message focuses on how a behavioral change (e.g. flossing) can help bring about a positive outcome (e.g. fresh breath), whereas a prevention framed message focuses on how a behavioral change can help avoid a negative outcome (e.g. bad breath). The emphasis is not on the relative effectiveness of gain vs. loss framed messages, but on the underlying regulatory focus induced by the message frame in participants’ mind and how it

affects subsequent information processing. There are other methods to induce promotion and prevention regulatory focus (Aaker & Lee, 2006). I chose to operationalize regulatory focus this way because of its implication for health communication message design.

CHAPTER 2

STUDY 1

2.1 Methods

2.1.1 Overview

This study used a 2 (Message regulatory frame: promotion vs. prevention) x 2 (Message efficacy focus: response efficacy vs. self-efficacy) x 2 (Argument strength: strong vs. weak support) design. The message on flossing was developed with information from the American Dental Association, as well as elements that were used in published research (Sherman, Mann, & Updegraff, 2006). The messages differ in focus, frame, and strength. The message efficacy focus (targeting response efficacy beliefs or self-efficacy beliefs) manipulation is crossed with the message frames (promotion or prevention) manipulation, creating two matched conditions (response efficacy beliefs with prevention frame, self-efficacy beliefs with promotion frame) and two mismatched conditions (response efficacy with promotion frame, self-efficacy with prevention frame). To help understand how such matching affects message processing, a strong and a weak version of the two matched messages and the two mismatched messages are created.

2.1.2 Stimulus Design

Message Regulatory Frame

The regulatory frame of the message is manipulated by varying the title, subtitle, opening paragraph, and wording in the body of the message. In the promotion frame message, the title and subtitle emphasize that flossing daily promotes fresh breath and healthy gums. The opening paragraph puts the participant in an imagined ideal scenario in which the person of his or her dreams compliments the fresh breath that he/she has. The participant is then told how he or she can achieve this positive outcome by flossing daily. In the prevention message, the title and subtitle emphasize that flossing daily prevents bad breath and gum disease. The opening paragraph puts the participant in the context of a dental visit and receives an unflattering comment about his or her breath. This scenario is created to remind participants of their responsibility to take care of their health and the negative consequences of failing to do so. The participant is then told how he or she can avoid the negative outcomes by flossing daily.

Message Efficacy Focus

The response efficacy and self-efficacy focus manipulation is done in the rest of the message. The response efficacy message emphasizes the benefit of flossing (i.e. achieving fresh breath and keeping gums healthy in the promotion condition, and preventing bad breath and gum disease in the prevention condition) or the cost of not flossing (i.e., losing fresh breath in the promotion condition, and getting bad breath in prevention condition). It draws the participant's attention to the connection between food particles left between the teeth and bacteria growth, as

well as gum disease and tooth loss in adults. The response efficacy messages ends with a bolded tag line, “You will notice the difference. Start flossing today,” which highlights the effectiveness of flossing on dental health. The self-efficacy message use phrases such as “you can do it!” and “you can achieve (avoid) this scenario” to enhance self confidence. It emphasizes the ease and effort aspects of flossing daily and includes instructions on how to floss correctly. The pamphlet ends with a bolded tag line “You can do it! Start flossing today.”

Argument Quality

The strong and weak argument manipulation is nested in the efficacy focus manipulation. Strong response efficacy messages are supported with expert opinion and statistics of how flossing cleans more surface area of the teeth, whereas the weak response efficacy messages are supported with non-expert opinion, personal experience, and specious arguments that upon close examination is either irrelevant or actually suggests that floss is not very effective in promoting fresh breath (or preventing bad breath). Strong self-efficacy messages claim that flossing daily is easy and emphasize that the participant can do it. The messages provides detailed instructions on flossing accompanied with pictures demonstrating each step of the process. The weak self-efficacy messages claim that flossing daily is easy and participants can do it, but the instructions on flossing were accompanied with uninformative pictures.

The stimuli used in this study appear in Appendix A.

2.1.3 Participants

Participants were 180 students (females = 66) in an introduction marketing course who received extra credit points in compensation for their participation.

2.1.4 Procedure

The stimuli used in this study were printed on regular legal size papers and randomly placed face down on workstations in a computer lab. The questionnaire was administered on computers using Empirisoft's MediaLab software. Each question in the questionnaire was presented individually on the computer screen.

Participants did this study in groups of 8 to 24 per session. The experimenter greeted them outside the lab and gave a brief introduction of the tasks before letting them into the computer room.

The first screen of instruction on the computer told the participants that they would be evaluating a health campaign pamphlet, and that the purpose of the study was to help design a pamphlet that would encourage students to use dental floss every day.

They were also informed that though dentists suggest that everyone should floss at least once a day, survey data found that the majority of college students do not floss.

To make the cover study more believable and to familiarize them with the thought listing and thought coding task, the participants were given three potential slogans and were asked to type down thoughts that they had about these slogans. They were also asked to help generate up to three slogans suitable for the new brochure.

After the thought listing and slogan generating tasks, participants categorized the slogans (provided and self-generated) in terms of the slogan's regulatory focus: a) whether it focused on something good and desirable or something bad and undesirable, and b) whether it made them feel eager (as being keen and enthusiastic) or vigilant (as being careful).

The participants were then asked to read a pamphlet concept which was placed face down in front of them. They were told to put the pamphlet face down again in front of them when they have finished reading it and not to read the pamphlet again for the remainder of the session.

Immediately after reading the pamphlet, the participants completed a thought listing task about the pamphlet that they had just read, answered a set of questions intended to check the effectiveness of message manipulation, reported their own attitude toward flossing daily, and coded their own thoughts in terms of focus and positivity.

Finally the participants filled out the need for cognition scale (Cacioppo, Petty, and Kao, 1984) and a demographics questionnaire. The whole study took about 25 to 30 minutes for most participants.

2.1.5 Independent Variables

The independent variables consist of the three design variables: message regulatory frame, message efficacy focus, and argument strength, as described previously. The participants' gender was used as a control variable in all subsequent regression and ANOVA models. To explore the extent to which the

personality differences may moderate the direction and magnitude of message processing, participants' need for cognition scores was also used as a covariate.

Need for Cognition Measurement

The need for cognition scale (Cacioppo, Petty, and Kao, 1984) is an 18 item scale that assesses individuals' propensity to engage in and enjoy effortful cognitive activities. Individuals who are high in need for cognition have a dispositional tendency to engage in extensive thinking about problems that may or may not affect them directly. Individuals who are low in need for cognition however tend not to engage in nor enjoy effortful thinking unless the problem is highly personally relevant. In the persuasion context, high need for cognition individuals have been shown to process message more carefully than low need for cognition individuals: high need for cognition individuals are more likely to distinguish between strong and weak arguments, generate more thoughts relevant to message content, and show higher correlation between attitude and the positivity of thoughts.

The average score of need for cognition in this sample was 3.4 ($SD = 0.57$; *Cronbach's* $\alpha = .85$), and there were no systematic differences across the different groups (see Table 2.3).

Manipulation Check

To check the quality of the stimulus design in manipulating the three main independent variables, participants answered a set of questions after the attitude measures. The results are summarized in Table 2.1.

The regulatory framing of the message was assessed by asking participants to indicate whether the message focused on approaching something good/desirable or

	Promotion Focus				Prevention Focus				
	Response Efficacy		Self-Efficacy		Response Efficacy		Self-Efficacy		
	Strong	Weak	Strong	Weak	Strong	Weak	Strong	Weak	
Good (Mean)	0.91	0.92	0.95	0.90	0.39	0.61	0.73	0.83	0.77
Good (SD)	0.71	0.72	0.78	0.69	0.50	0.50	0.54	0.62	0.42
Eager (Mean)	0.83	0.64	0.81	0.65	0.57	0.48	0.59	0.67	0.35
Eager (SD)	0.39	0.49	0.40	0.49	0.50	0.51	0.50	0.49	0.48
Efficacy (Mean)	0.22	0.20	0.43	0.55	0.18	0.22	0.50	0.50	0.33
Efficacy (SD)	0.42	0.41	0.51	0.51	0.39	0.42	0.51	0.51	0.47
Strength (Mean)	3.87	2.77	3.29	3.15	3.98	3.10	3.08	3.56	3.36
Strength (SD)	0.67	0.83	0.69	0.80	0.52	0.86	0.85	0.56	0.83
N	23	25	21	20	28	23	22	18	180
Female	10	9	9	7	5	8	10	8	66

Table 2.1: Manipulation check and sample size as a function of message frame, message efficacy, and argument strength. Good: proportion of participants thought message focused on something good/desirable; Eager: proportion of participants said message made them feel eager; Efficacy: proportion of participants said message focused on building self confidence; Strength: rating on the strength of message.

avoiding something bad/undesirable, and the extent to which the message made them feel eager (as being keen and enthusiastic) and vigilant (as being careful).

The results indicate that participants who saw a promotion framed message were more likely to categorize it as focusing on approaching something good/desirable vs. avoiding something bad/undesirable (promotion: 92% vs. prevention: 62%, $\chi_1^2 \geq 22, p < 0.01$). They were also more likely to categorize the message as making them feel more eager than vigilant (promotion: 73% vs. prevention: 57%, $\chi_1^2 \geq 4.3, p < 0.05$). Two separate logistic regression models with the three manipulated variables and their interactions as predictors and the two categorization results as dependent variables were fit. Only the main effect of the promotion vs. prevention manipulation was found to be significant at 0.05 level. Thus the regulatory frame manipulation was successful and not confounded with the message efficacy focus and argument strength manipulation. See Table 2.3 for proportion of participants in each condition categorized the message as promotion focused.

The response efficacy vs. self-efficacy manipulation was assessed by asking participants to indicate whether the message focused drawing attention to the relationship between a behavior and the outcome of that behavior (response efficacy) or it focused on enhancing a person's confidence in his or her ability to implement a behavior (self-efficacy).

The manipulation of response and self-efficacy focus were also effective. Participants in the self-efficacy message conditions were more likely to correctly categorize the messages as focusing on enhancing a person's self confidence than participants in the response efficacy condition (self-efficacy condition: 49% vs.

response efficacy condition: 20%, $\chi_1^2 \geq 16, p < 0.001$). Logistic regression of message categorization on the three message variables also indicates only a main effect for the message efficacy focus variable. Thus the efficacy focus manipulation was not confounded with regulatory frame or the argument strength manipulation. See Table 2.3 for proportion of participants in each condition categorized the message as being focused on self efficacy.

Participants then rated on 5-point ($1 = \textit{strongly disagree}$; $5 = \textit{strongly agree}$) scales the extent to which they thought the pamphlet was persuasive, effective, and that it contained compelling arguments.

These three ratings were moderately correlated (average $r = 0.64$). The average rating from these three items was used as an index of message strength, with larger values equal to stronger perceived argument strength.

The argument strength manipulation was however not equally successful across the conditions. The strong and weak arguments were perceived to be strong and weak in the response efficacy condition ($p < 0.01$), with about the same level of difference in strength across the message regulatory frame conditions:

$Diff_{strong-weak} = 0.65$ in the promotion frame condition; $Diff_{strong-weak} = 0.28$ in the prevention frame condition.

The manipulation in the self-efficacy strength condition were however ineffective. The rated strength of these message were not statistically significant ($p = 0.3$).

2.1.6 Dependent Measures

Thought Listing Measure

Immediately after reading the pamphlet, participants were instructed to list any thoughts that came to their mind in response to the pamphlet. They were told to type down one thought at a time into a text box on the computer. They were given up to seven trials and were allowed to take as much time as they needed to complete the task.

Participants were asked to code the thoughts that they had generated in response to the pamphlet after they had completed the other dependent measures. They coded each thought twice, once on its focus and once on its positivity. The focus coding categorizes each thought as either about the design of the pamphlet, about the participants' own reaction to flossing daily, or about something else. Thoughts unrelated to either the design or reaction to flossing were excluded in cognitive response analysis. The positivity coding categorizes each thought as being positive/for flossing daily or negative/against flossing daily.

A positivity index was constructed according to the following formula, using thoughts that participants self coded either as about the design of the pamphlet or their own reaction to flossing daily (with irrelevant thoughts excluded). It reflects the difference in proportion of positive vs. negative thoughts that came to a participant's mind when he or she was reading the pamphlet. The means and standard deviations of this index conditions can be found in Table 2.3.

$$Index = \frac{\textit{positive thoughts} - \textit{negative thoughts}}{\textit{total thoughts}} \quad (2.1)$$

Attitude

Post-message attitude was measured with five items. Participants indicated their positivity toward flossing daily along five semantic differential items on 7-point scales. The scale anchors are good-bad, wise-foolish, beneficial-detrimental, desirable-undesirable, and positive-negative.

The five attitude measures were first subjected to a factor analysis using maximum likelihood method with promax rotation. The analysis rejected a single factor solution ($p < 0.01$) in favor of two factors. Two of these items (“good-bad” and “wise-foolish”) loaded mainly on the first factor whereas two other items (“desirable-undesirable” and “positive-negative”) mainly loaded on the second factor. “Beneficial-detrimental” is split between the two. The two factor solution accounts for 62.4% of the variance, of which 33% was by the first factor. See Table 2.2 for correlation among these items and factor loadings detail.

	good	wise	beneficial	desirable	positive	Factor1	Factor2
good	1.00					0.63	0.15
wise	0.70	1.00				1.09	-0.16
beneficial	0.37	0.42	1.00			0.25	0.36
desirable	0.26	0.22	0.29	1.00		-0.08	0.62
positive	0.40	0.32	0.41	0.50	1.00	-0.14	0.94

Table 2.2: Correlation and factor loadings of attitude measures (Study 1).

The first factor may be interpreted as the cognitive dimension of participants’ flossing attitude whereas the second factor reflects the more affective dimension. Two composite indexes were thus created, with larger values indicating more

positive attitude: the cognitive index ($M = 6.6$; *Cronbach's* $\alpha = 0.75$) is an average of the standardized 'good', 'wise', and 'beneficial' scores; and the affective index ($M = 5.8$; *Cronbach's* $\alpha = 0.63$) is an average of the standardized 'desirable' and 'positive' scores. Please see Table 2.3 for the means of these two indexes based on the unstandardized scores by experiment conditions.

2.2 Results

2.2.1 Analysis Overview

The hypothesis regarding matching on message elaboration derived from the elaboration likelihood model predicts that under relative low to moderate cognitive elaboration, matching efficacy focus with the regulatory frame of the message increases message elaboration whereas mismatching does not increase or may even decrease message elaboration. This led to the prediction that the difference in attitude between those who read the strong message vs. those who read the weak message is larger under matched conditions than under mismatched conditions, which could be tested as a two way interaction between argument quality and matching or a three way interaction between message frame, message efficacy focus, and message strength.

These variables were coded as follows in the analysis: message regulatory frame ('frame' in regression models: 1 = prevention frame; -1 = promotion frame), message efficacy focus ('efficacy': 1 = response efficacy; -1 = self-efficacy), and argument quality ('argument': 1 = strong; -1 = weak). Using this coding the three-way interaction effect reflects a contrast of argument quality on attitude (strong - weak) between response efficacy and self-efficacy message conditions

	Promotion Focus				Prevention Focus			
	Response Efficacy		Self-Efficacy		Response Efficacy		Self-Efficacy	
	Strong	Weak	Strong	Weak	Strong	Weak	Strong	Weak
Thoughts (Mean)	3.9	4.5	4.0	4.4	4.6	4.8	4.6	4.1
Thought (Mean)	0.48	-0.15	0.25	0.35	0.35	0.14	0.15	0.25
Thought (SD)	0.60	0.80	0.69	0.59	0.59	0.63	0.68	0.76
Knowledge (Mean)	6.61	6.53	6.68	6.57	6.62	6.58	6.64	6.74
Knowledge (SD)	0.57	0.54	0.51	0.53	0.50	0.56	0.66	0.37
Attitude (Mean)	6.04	6.06	5.50	5.35	5.89	5.50	6.00	6.11
Attitude (SD)	1.00	0.92	1.13	1.48	0.98	1.21	1.08	0.99
NFC (Mean)	3.35	3.51	3.25	3.62	3.31	3.64	3.32	3.53
NFC (SD)	0.64	0.53	0.43	0.55	0.68	0.53	0.43	0.66
N	23	25	21	20	28	23	22	18
Female	10	9	9	7	5	8	10	8
Grand								

Table 2.3: Dependent measures, need for cognition, and sample size as a function of message frame, message efficacy, and argument strength. Knowledge: rating on flossing is good, wise, and beneficial; Attitude: the extent to which participants held a positive evaluation of flossing daily and thought flossing daily is desirable; Thoughts: number of relevant thoughts listed; Thought: cognitive response positivity; NFC: Need for cognition.

(response efficacy - self efficacy) across regulatory frames (prevention - promotion). If criteria of causal inference are satisfied, the hypothesis is supported when this contrast yields a statistically significant positive value. The hypothesis is not supported when this contrast gives a statistically significant negative value.

To help interpret the models, the interaction effects are presented as graphs. These graphs are effect plots based on the adjusted means calculated using model coefficients (Fox, 2003, Journal of Statistical Software). When presenting the effects involving a covariate (i.e. need for cognition), three levels of the covariate representing the mean, one standard deviation below the mean, and one standard deviation above the mean were chosen (Aiken and West, 1991).

The cognitive index of attitude exhibited an apparent ceiling effect: participants across all experimental conditions showed very positive evaluation of flossing daily regardless of message received. Their affective index data were more variable. Thus we'll focus the remainder of the analysis on the affective index.

2.2.2 Matching and Attitude Differences

Exploratory analysis of the affective index of attitude (examining the means patterns from Table 2.3) lends some support for the predicted pattern of attitude scores. For example the strong and weak argument quality manipulation of response efficacy focus had a larger effect when the message began with a prevention frame (matched condition: 5.89 *vs.* 5.50) than when it began with a promotion frame (mismatched condition: 6.04 *vs.* 6.06). On the other hand the self-efficacy argument quality manipulation had larger effect when the message began with a promotion frame (matched condition: 5.5 *vs.* 5.35) than when it began with a prevention frame

(mismatched condition: 6.00 *vs.* 6.11). However these differences are small compared to the standard deviations of the measures.

The affective index of attitude on flossing was subjected to a three-way (2 x 2 x 2) analysis of variance. I first fit a model with only the design variables: message regulatory frame, message efficacy focus, and argument strength. This model contains the main effects, two-way, and three-way interaction effects of the message variables. A second model was fit by adding the main effect of gender into model one. This was done to control baseline differences in flossing attitude between men and women.

The message effects only model ($F(7, 172) = 1.8$; $p = 0.086$; $R^2 = 0.069$; Adjusted $R^2 = 0.031$) found no significant main effects for the message variables at the .05 significance level. The model did find a significant two way interaction effect involving message regulatory frame and message efficacy focus $F(1, 172) = 9.4$, $p = 0.0025$. This effect will be examined further in the context of argument strength after gender differences was controlled for. No other interaction effects were significant at the .1 significant level.

The message plus gender effects model ($F(8, 171) = 3.1$; $p = 0.0031$; $R^2 = 0.12$; Adjusted $R^2 = 0.084$) found a significant main effect for gender $F(1, 171) = 11$, $p = 0.0011$, indicating that women had more positive attitude toward flossing. No significant main effects were found for the message variables at the .05 significance level. The two way interaction effect involving message regulatory frame and message efficacy focus found in the message only model remained significant $F(1, 171) = 7.8$, $p = 0.0057$). This was due to the fact that the mean attitude toward flossing was more positive in the prevention frame condition

($M = 6.0$) than that in promotion frame condition ($M = 5.4$) when the message was supported with self-efficacy information, but it was less positive

($M_{prevention} = 5.7$ vs. $M_{promotion} = 6.1$) when the message was supported with response efficacy information.

	df	MS	F	p
gender	1	7.53	10.94	0.001
frame	1	0.89	1.30	0.256
efficacy	1	1.21	1.76	0.186
argument	1	0.21	0.30	0.583
frame * efficacy	1	5.39	7.84	0.006
frame * argument	1	0.17	0.25	0.617
efficacy * argument	1	0.54	0.79	0.376
frame * efficacy * argument	1	1.07	1.55	0.214
Error	171	0.69		

Table 2.4: Analysis of variance for attitude affective scores (Study 1).

The predicted three way interaction involving message regulatory frame, message efficacy focus, and argument quality, though appeared to be in the right direction, failed to achieve statistical significance. A contrast analysis based on model two indicated a larger positive effect ($Diff = -0.039; p = 0.87$) of argument strength under matched conditions vs. mismatched conditions, but the 95% confidence interval for this effect is wide and covers zero ($-0.51, 0.43$). The predicted attitude (mean centered) scores are displayed in Figure 2.1 and the ANOVA results appear in Table 2.4.

Figure 2.1 reveals that the argument quality manipulation had no significant effect in the promotion frame conditions. There was however a strong effect of

Message frame, efficacy information, and argument quality effect

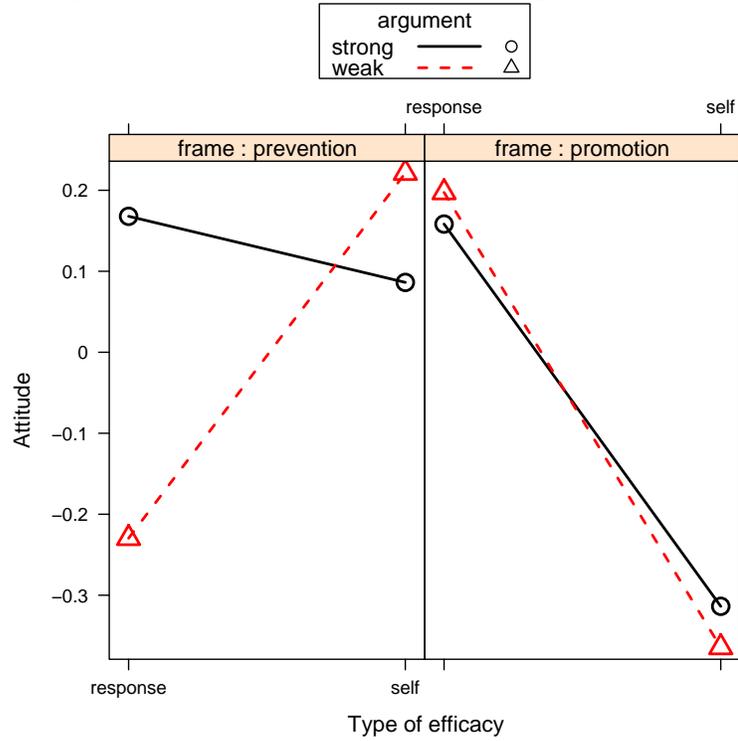


Figure 2.1: Attitude predicted by message frame (presented as panels: prevention; promotion), efficacy (x axis: response efficacy, self-efficacy), and argument strength (lines in the panels: strong = strong argument; weak = weak argument).

message efficacy focus. Thus from this data, it seemed that when participants were primed with a promotion focus goal, they responded positively to the response efficacy messages and negatively to the self-efficacy messages without carefully examining the arguments in the persuasive appeals. When participants were primed with a prevention focus goal, they were more discerning of the argument quality, especially when the message was supported with response efficacy information. Thus the predicted effect of matching was found in the prevention focus condition, but absent in the promotion focus condition.

2.2.3 Cognitive Response

To understand why promotion focus biased participants to respond indiscriminately positively toward the response efficacy message, I turned to their cognitive response data. It can be seen from Table 2.3 that in the prevention frame condition, the thought positivity data were largely consistent with the attitude data: when a prevention message was supported with response efficacy information, the quality of the evidence is important. Strong argument led to more positive cognitive responses and weak argument led to fewer positive cognitive responses. Surprisingly this difference was larger in the promotion frame condition. When the message began with a promotion frame and followed up with response efficacy information, participants who read the strong argument message generated more positive cognitive responses than all other groups and participants who read the weak argument message generated more negative cognitive responses than all other groups. There appeared to be no significant differences in cognitive response toward

the self efficacy messages within and between the prevention and promotion conditions.

To analyze this data formally, the thought index was first fit to a 2 x 2 x 2 model with the main effects, two-way, and three-way interaction effects of the message variables. A second model with gender added as a main effect was also fit. Gender turned out to be a non-significant predictor, $F(1, 169) = 0.03$, $p = 0.86$. It was dropped from further analysis and results from the message effects only model are presented here.

The fitted model ($F(7, 170) = 1.9$; $p = 0.067$; $R^2 = 0.074$; Adjusted $R^2 = 0.036$) and results are presented in Table 2.5. The predicted three-way interaction effect was not significant $F(1, 170) = 1.1$, $p = 0.3$. The only effect that reached statistical significance was the efficacy by argument strength interaction ($F(1, 170) = 6.6$, $p = 0.011$), reflecting the observation that argument quality had a larger effect in the response efficacy conditions than that in the self-efficacy message conditions. The predicted thought positivity scores are presented in Figure 2.2 and analysis of variance results are in Table 2.5.

Figure 2.2 shows that the cognitive response data are consistent with attitude data (see Figure 2.1) only in the prevention frame condition. For those who read the promotion framed message, there were two apparent patterns of dissociation. First when the message frame was mismatched with response efficacy information, strong arguments was preferred over weak arguments. This difference was missing from the attitude data. Secondly, when the message was matched with self efficacy information, the thought favorability was above the overall mean level of positivity and close to the average level of positivity participants had shown toward prevention

Message frame, efficacy information, and argument quality effect

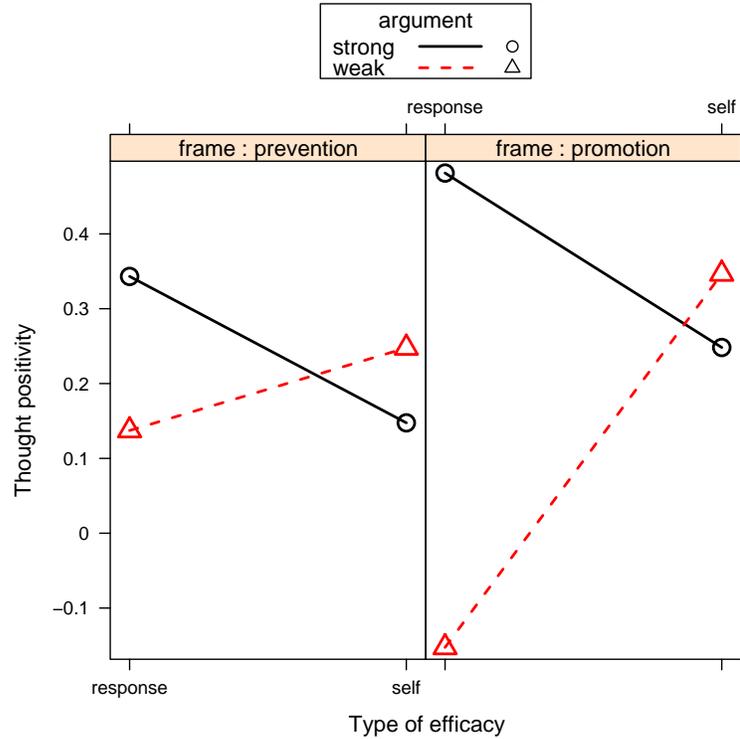


Figure 2.2: Thought positivity predicted by message frame (presented as panels: prevention; promotion), efficacy (x axis: response efficacy, self-efficacy), and argument strength (lines in the panels: strong = strong argument; weak = weak argument).

	df	MS	F	p
gender	1	0.01	0.03	0.863
frame	1	0.01	0.01	0.906
efficacy	1	0.09	0.20	0.658
argument	1	1.13	2.50	0.116
frame * efficacy	1	0.33	0.74	0.390
frame * argument	1	0.50	1.12	0.292
efficacy * argument	1	2.95	6.53	0.011
frame * efficacy * argument	1	0.50	1.10	0.296
Error	169	0.45		

Table 2.5: Analysis of variance for thought positivity index (Study 1).

framed self efficacy messages. This suggests that participants were not rejecting the promotion focused self efficacy message more than other groups did. However, as it was shown previously, the attitude scores of participants who read the promotion focused self efficacy messages were the lowest compared to those of all other groups.

In short, the findings suggest that strong response efficacy arguments led to more positive attitude over weak response efficacy arguments regardless of the regulatory frame. This finding is in contrast with the fit argument I had advanced in which I had predicted that the effect of argument strength would be greater in the matched conditions over the mismatched conditions.

2.2.4 Attitude and Cognitive Response Correlation

To better understand the connection between regulatory frame/efficacy matching, cognitive response, and attitude, a regression model was fit with attitude as the dependent variable, gender, thought positivity index and its interaction with the message variables as predictors. In this analysis the message frame variable and

message efficacy focus variable were used to create a variable indicating whether there was a match between message frame and message efficacy focus. This ‘match’ variable was used in the model in place of the two variables. This model ($F(8, 169) = 3.4$; $p = 0.0014$; $R^2 = 0.14$; Adjusted $R^2 = 0.096$) reveals that when there was no match between message regulatory frame and message efficacy focus for both strong and weak messages, attitude had a positive correlation of similar magnitude with thought favorability. However when the regulatory frame and message efficacy focus was matched, attitude had a positive correlation with cognitive response when the message was supported with strong argument, but a negative correlation with cognitive response if the message was supported with weak arguments (see Figure 2.3 and Table 2.6). The fact that in weak message conditions attitude was positively correlated with cognitive response when there was no match between regulatory frame with message efficacy focus and a reversed relationship when there was uniquely interesting if not counter-intuitive. This correlation will be further examined in study 2.

2.2.5 Effect of Need for Cognition

If matching regulatory frame and efficacy focus affects elaboration likelihood, then the strength of this effect should also be moderated by individual differences in baseline elaboration likelihood in predictable ways. In this section I’ll explore the moderating effect of individual differences in need for cognition, as it has been reported in numerous studies to have an important role in persuasion and information processing.

Thought positivity*matching*argument quality effect

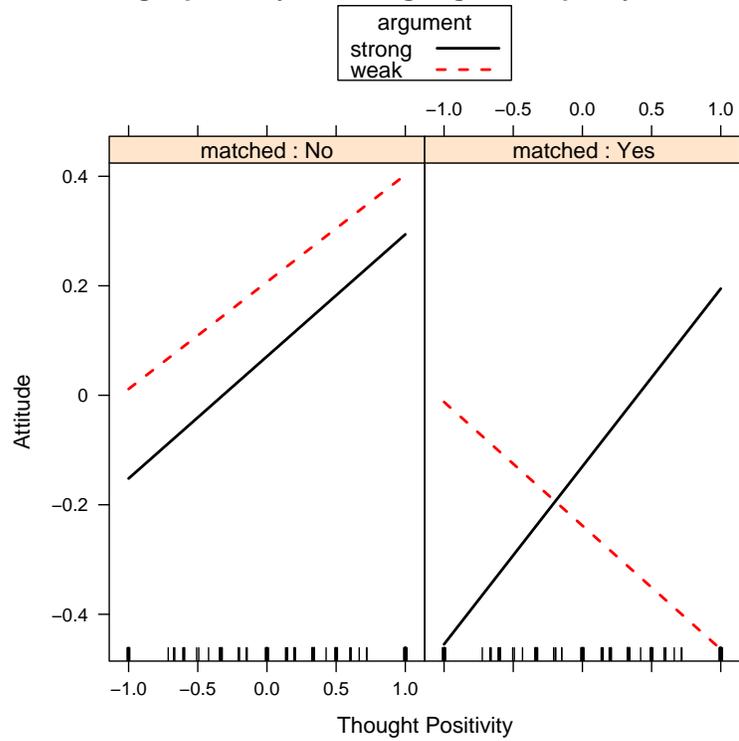


Figure 2.3: Attitude-cognitive response relationship as a function of matching and argument strength, controlled for gender. The distributions of thought positivity data within the matched and mismatched conditions are represented as bars on the X axis.

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.030	0.07	0.44	0.664
gender1	0.202	0.06	3.12	0.002
thtindex	0.129	0.09	1.37	0.172
matched1	0.162	0.07	2.41	0.017
argument1	-0.007	0.07	-0.10	0.917
thtindex:matched1	0.080	0.09	0.85	0.398
thtindex:argument1	0.144	0.09	1.53	0.128
matched1:argument1	-0.061	0.07	-0.92	0.361
thtindex:matched1:argument1	-0.131	0.09	-1.39	0.167

Table 2.6: Regression of attitude on cognitive response by condition, controlled for gender differences (Study 1). Note. gender1 = female. thtindex = thought positivity index. matched1 = mismatch between regulatory frame and efficacy focus. argument1 = strong argument.

Because high need for cognition individuals have a higher baseline likelihood to process information more carefully, the effect of argument quality should be less affected by whether there is a match between the message’s regulatory frame and efficacy focus. That is, they should be able to distinguish the argument quality differences found in the messages compared to low need for cognition individuals who may need the extra influence of matching to increase their motivation to scrutinize the information. Similar arguments had been put forth in Evens and Petty (2003). This leads to a four way interaction prediction among message regulatory frame, message efficacy focus, argument quality, and need for cognition.

This four-way interaction effect based on the raw data is presented in Figure 2.4. Individuals were categorized as high, medium, and low in need for cognition with a 10% overlap between the adjacent categories.

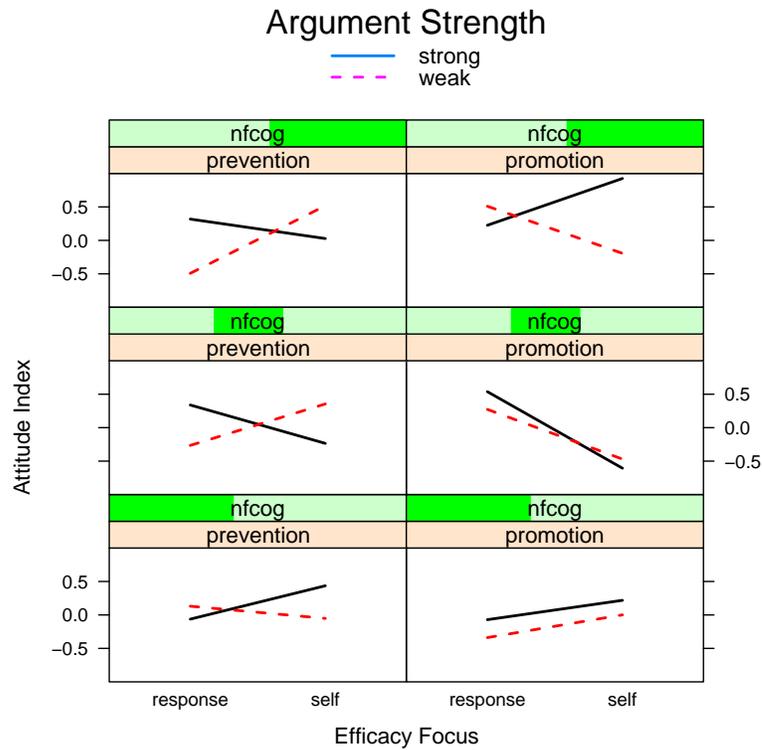


Figure 2.4: Raw attitude scores for high (top row), medium, and low (bottom row) need for cognition (nfcog) individuals by message frame (presented as panels: prevention; promotion), efficacy (x axis: response efficacy, self-efficacy), and argument strength (lines in the panels: strong = strong argument; weak = weak argument).

Looking at the high need for cognition participants in Figure 2.4, it appears that they were the ones that had been most affected by the regulatory focus and efficacy matching effect, rather than the low need for cognition participants. The high need for cognition individuals were more discerning about the argument quality in the matched conditions than in the mismatched conditions. Figure 2.4 also suggests that the high need for cognition group may more likely be influenced by regulatory focus and efficacy matching when the messages are strong.

An analysis of covariance model was fit with all the effects in the message effects model, plus the main effects of need for cognition, and two, three, and four way interaction effects between need for cognition and the message effect terms. Need for cognition was entered into the model as either a centered continuous variable or as a dichotomous variable following a median split. The two models produced similar results. I present here the model with need for cognition entered as a continuous variable. An omnibus F test comparing the more complex model and the model without need for cognition indicated a significant amount of variance reduction.

The model ($F(16, 163) = 2.1$; $p = 0.011$; $R^2 = 0.17$; Adjusted $R^2 = 0.09$) and ANCOVA results are presented in Table 2.7.

The overall four-way interaction interaction effect was not statistically significantly, $t(163) = 0.91$; $p = 0.36$. Figure 2.5 displays the relationship between adjusted attitude scores for average, low, and high need for cognition individuals, with the centered need for cognition score set respectively at the mean, one standard deviation below and one standard deviation above the mean. It appears that the high need for cognition individuals were the ones that had been most affected by the regulatory frame and efficacy focus matching effect, rather than the low need for cognition participants. However caution should be taken in interpreting the data this way given that the four-way interaction effect was not significant.

2.3 Discussion

Study 1 provided the first test of the hypothesis that matching regulatory frame with response vs. self-efficacy may lead to increased message elaboration,

Message Variables by Need for Cognition Effect

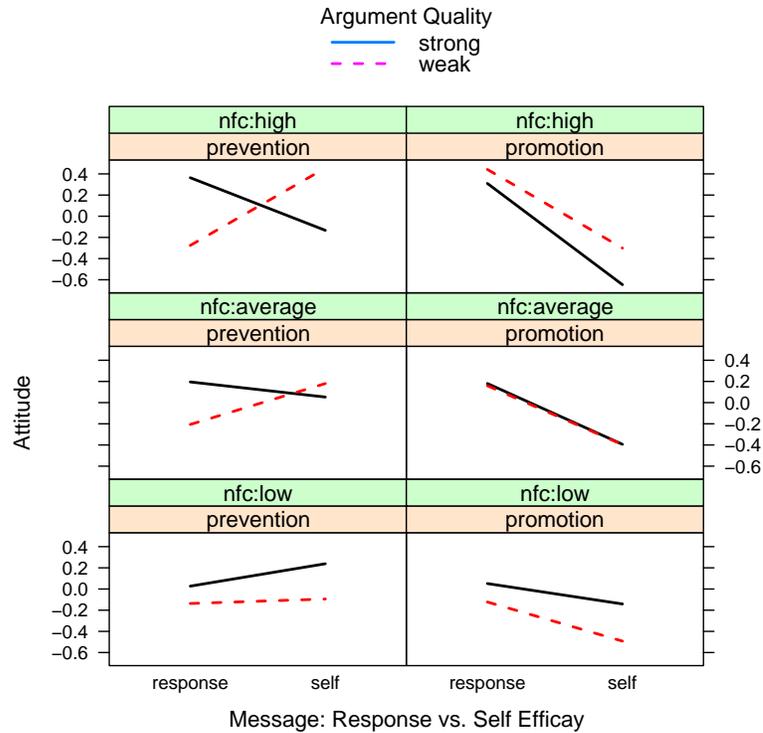


Figure 2.5: Predicted attitude for high and low need for cognition individuals by message frame (presented as panels: prevention; promotion), efficacy (x axis: response efficacy, self-efficacy), and argument strength (lines in the panels: strong = strong argument; weak = weak argument).

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.02	0.07	0.34	0.734
gender1	0.19	0.07	2.88	0.005
frame1	0.08	0.06	1.30	0.196
efficacy1	0.11	0.06	1.71	0.090
argument1	0.04	0.06	0.58	0.566
ncog.c	0.10	0.12	0.81	0.420
frame1:efficacy1	-0.17	0.06	-2.65	0.009
frame1:argument1	0.03	0.06	0.48	0.630
efficacy1:argument1	0.07	0.06	1.06	0.292
frame1:ncog.c	-0.01	0.12	-0.12	0.903
efficacy1:ncog.c	0.13	0.12	1.06	0.292
argument1:ncog.c	-0.16	0.12	-1.32	0.188
frame1:efficacy1:argument1	0.06	0.06	0.99	0.326
frame1:efficacy1:ncog.c	-0.12	0.12	-1.02	0.311
frame1:argument1:ncog.c	0.06	0.12	0.51	0.612
efficacy1:argument1:ncog.c	0.19	0.12	1.63	0.104
frame1:efficacy1:argument1:ncog.c	0.11	0.12	0.91	0.363

Table 2.7: Analysis of variance for attitude on message variables and need for cognition, controlled for gender differences (Study 1). Gender1 = Female, frame1 = prevention focus message, efficacy1 = response efficacy message, argument1 = strong argument, ncog.c = centered value of need for cognition score.

which could be the mechanism giving rise to previous findings that such matching increases the effect of persuasion.

The results did not provide support for this hypothesis. In the attitude data and cognitive response data, no increased processing of message content was observed in the self efficacy message conditions when the message was matched with a promotion frame. The attitude data in the response efficacy message conditions suggest that when response efficacy information was paired with a prevention frame, message quality had a larger effect on attitude; whereas when it was paired with a

promotion frame, matching reduced message processing with a positive bias. The cognitive response data indicate however that there was a disconnect between reported attitude and cognitive response in the promotion frame condition.

However this should not be taken as evidence that matching regulatory frame and efficacy focus does not lead to increased persuasion effect because some unknown variables could have moderated the effect in opposite directions. I explored the effect of need for cognition in this regard and found some indication that high need for cognition individuals may be more likely to be affected by matching. In addition, a fair test of the matching hypothesis requires that the self-efficacy messages be equally strong (in the strong condition) or equally weak (in the weak conditions) as the response efficacy messages, but differs only with regard to regulatory frame. The message strength ratings indicate that this was not the case in this study. This lack of parity between the argument quality of self-efficacy and response efficacy messages however does not invalidate the interpretation of the matching by argument strength interaction effect, which is the main hypothesis being tested.

One interesting result from the attitude and cognitive response correlation analysis suggests that more positive cognitive response may not always lead to more positive attitude. Indeed a negative correlation was found when there was match between regulatory frame and message efficacy focus and the message turned out to be weak. Under this scenario, the more positive cognitive response was related to less positive attitude.

CHAPTER 3

STUDY 2

3.1 Overview

In the previous study argument quality manipulation had a larger effect on attitude when the message began with a prevention frame rather than a promotion frame. The cognitive response analysis suggests however that when response efficacy was matched with promotion frame it might have intensified message scrutiny more than a prevention frame. In both cases though, the self-efficacy messages did not produce significant changes in attitude nor cognitive response.

There were two goals for study two. The main purpose was to address potential confounds in study 1 that could have led to the unpredicted pattern of results. First, it was possible that the initial slogan generation creativity task and the subsequent promotion vs. prevention categorization task might have raised awareness of the manipulation, thus caused reactance among participants in the matched conditions. In this study, these tasks were removed. Secondly, it was suspected that the pictures in the self-efficacy conditions might have diverted participants' attention from the content of the message, thus causing the argument strength manipulation to be ineffective.

The second purpose of study two was to examine the persistence of attitude over time and assess the impact of attitude on actual behavior as a function of matching between regulatory focus and message efficacy. Thus this study was conducted in three phases, over a period of two weeks.

Study two used the same experimental design as that of study one.

3.2 Method

3.2.1 Stimulus Design

Message Frame and Message Efficacy

A small group of students ($n = 7$) of the same age as the intended subject pool participated in two focus group sessions to give feedback on the stimuli adapted from those used in study one. They were briefed about the theories underlying this research and were asked to make revisions to the draft messages so that the regulatory focus, efficacy, and argument strength of the messages were appropriately calibrated. Their feedback was incorporated into the revision of the messages.

The regulatory focus and response efficacy manipulations remain largely the same as that in study one, with some minor revisions. For example, in regulatory focus manipulation, “You can achieve naturally fresh breath if you floss every day” was added to the beginning of the second paragraph of the promotion frame messages and “You can avoid bad breath and gum disease by flossing every day” was added to the prevention frame messages.

Argument Quality

The strong and weak argument manipulation in the response efficacy conditions were the same as those used in study one. The message quality

manipulation in the self-efficacy condition underwent significant changes because they were not effective in study one.

First, the pictures used in study 1 were removed to reduce this potential confound on the manipulation of response vs. self efficacy. In addition, suggestions on how to make flossing everyday easy were offered. These were written in a way that made flossing daily sound more effortful in the weak message condition and less effortful in the strong message condition. The strong self-efficacy messages informed the participants that flossing daily is easy and that they could do it everyday. Participants were given practical tips to make floss available to them when they needed it. The message also mentioned that flossing might cause gum bleeding at first, but it would go away after the gums had been flossed a few times. A condensed version of flossing instructions, which characterized flossing as simple as 1, 2, 3, was also given to the participants. The message ended with a bolded tag line: ‘Floss daily! You can do it. Start today.’

The weak self-efficacy messages told participants that flossing daily take skills, time, and effort, but they *should* be able to do it everyday. They were told not to be afraid of seeing their gums bleed and that even regular flossers could hurt their gums and cause them to bleed. The tip given to them was a suggestion that they should mark 10 minutes off their calendar for each day of the week so that they would remember flossing daily. They were also given a more complex version of instructions on how to floss properly. The message ended with a bolded tag line: ‘Floss daily! It can be done. Start today.’

The paper version of the stimuli used in this study appear in Appendix B.

3.2.2 Participants

Participants were 115 students (females = 60) in introduction marketing and communication courses who received extra credit points in compensation for their participation.

3.2.3 Procedure

This study was conducted in three phases. In the first phase, the participants filled out a questionnaire that measured individual differences in regulatory focus (Higgins et al., 2001) and need for cognition (Cacioppo, Petty, & Kao, 1984). Participants were told that they would be evaluating a health campaign brochure and was asked to fill out the questionnaire as part of the sign-up process. This part of the data was collected online and most participants completed it two to seven days before the main experiment. The potential interacting effects of regulatory focus on message processing will not be explored in this study due the relatively small sample size.

The second phase of the study was conducted in a lab. There were a few changes in procedure in study two. First, the slogan generation creativity task was removed from the protocol. Participants were given the flossing message right after the initial introduction about the study. Secondly, the paper pamphlets were replaced by PowerPoint slideshows on the participants' computer. Thirdly, the messages were revised and the pictures were taken out of the pamphlet. Finally the attitude measures were moved to the beginning of the questionnaire, before all other questions and immediately after participants had finished reading the pamphlet and before the thought listing task. At the end of phase two participants were given ten

samples of single use floss before they left the experiment site. Otherwise the same set of procedures used in study one was used in this part of study two.

A week later an email request was sent to the participants. In the email they were asked to fill out a simple five minute follow-up survey. The survey asked about how often participants flossed in the previous week, the number of sample floss used, and their attitude on flossing everyday.

3.2.4 Independent Variables

The independent variables consist of the three message variables. As in study one, participants' gender was used as a control variable in analysis of variance and regression models to partial out variances in the dependent variables that were due to pre-existing differences in gender. Another control variable, participant's past flossing behavior, was used to control pre-existing differences between those who did not floss regularly and those who already had the habit of flossing ¹.

On average, participants flossed 1.8 ($SD = 2.9$) times a week prior to the study, with 56% of the participants did not floss at all in the previous week.

The extent to which participant engages in and enjoy thinking about everyday problems was again measured with the need for cognition scale. The average score was 3.5 ($SD = 0.6$).

Message Strength Manipulation Check

Participants were asked to tell how persuasive, convincing, and effective the message and arguments were (*all on 5 point scales: anchored at not at all and very*). These questions are used to check the argument strength manipulation. The average

¹Due to a programming error, study one only collected past flossing behavior from a small fraction of the participants. Thus it was not included in the analysis reported in study one.

of these three items was used an index of the argument strength (see Table 3.1). The results were again less than satisfactory: although individuals in the promotion frame conditions rated the strong self-efficacy message to be stronger than the weak self-efficacy message ($Diff_{strong-weak} = 0.36$), those in the prevention frame message conditions rated the weak self-efficacy message to be stronger than the supposedly strong message ($Diff_{strong-weak} = -0.20$). However neither of these differences were significantly different from zero at $alpha = .05$. The means and cell sizes are in Table 3.1.

3.2.5 Dependent Measures

Attitude, Intention, and Thought Listing

The thought listing and rating tasks were the same as those used in study one. Participants' own coding of the thoughts they generated was used to compute a thought positivity index. Overall, participants generated more positive thoughts than negative thoughts in response to the messages. The raw thought index means by conditions are in Table 3.3.

All of the five attitude items from study one were kept in this study, but two additional questions were added to measure how much participants thought flossing daily was necessary and worthwhile. Both of these items were measured on 7-point semantic differential scales anchored respectively at unnecessary - necessary and worthless - worthwhile.

The seven attitude measures were subjected to a factor analysis, using maximum likelihood method of estimation and promax rotation. The factor analysis found that even a three factor solution accounted for only 60% of the variance. Examination of the correlation matrix found that 'desirable' had low correlations

	Promotion Focus				Prevention Focus				
	Response Efficacy		Self-Efficacy		Response Efficacy		Self-Efficacy		
	Strong	Weak	Strong	Weak	Strong	Weak	Strong	Weak	
Good (M)	0.73	0.67	0.85	0.82	0.27	0.38	0.41	0.69	0.58
Good (SD)	0.46	0.49	0.38	0.40	0.46	0.50	0.51	0.48	0.50
Eager (M)	5.87	4.07	4.62	4.09	5.13	4.38	4.53	4.69	4.69
Eager (SD)	1.19	1.87	1.39	1.38	1.06	1.50	1.66	1.11	1.49
Vigilant (M)	5.53	3.93	4.69	4.00	4.47	3.94	4.41	4.15	4.40
Vigilant (SD)	1.13	1.67	1.25	1.41	1.68	1.39	1.23	1.14	1.43
Benefit (M)	4.33	4.20	4.31	3.64	4.00	4.06	4.24	4.15	4.13
Benefit (SD)	0.62	0.56	0.48	0.92	1.00	0.77	0.75	0.80	0.76
Cost (M)	3.80	3.40	2.77	3.09	4.33	3.62	3.88	3.15	3.55
Cost (SD)	0.77	1.24	1.09	1.14	0.49	1.15	1.05	1.14	1.10
Efficacy (M)	0.00	0.00	0.46	0.64	0.00	0.00	0.06	0.46	0.17
Efficacy (SD)	0.00	0.00	0.52	0.50	0.00	0.00	0.24	0.52	0.38
Strength (M)	4.22	3.22	3.36	3.00	3.91	3.54	3.47	3.67	3.57
Strength (SD)	0.59	1.11	1.04	1.17	0.56	0.80	0.67	0.47	0.87
N	15	15	13	11	15	16	17	13	115
Female	10	11	5	8	9	9	4	4	60

Table 3.1: Manipulation check and sample size as a function of message frame, message efficacy, and argument strength (Study 2).

	good	wise	beneficial	desirable	positive	worthless	necessary	Factor1	Factor2
good	1.00							0.70	0.19
wise	0.73	1.00						0.93	-0.04
beneficial	0.66	0.72	1.00					0.85	-0.09
desirable	0.45	0.47	0.29	1.00				0.47	0.04
positive	0.48	0.36	0.26	0.23	1.00			-0.15	0.86
worthless	0.46	0.46	0.39	0.18	0.55	1.00		0.06	0.70
necessary	0.47	0.45	0.42	0.35	0.47	0.54	1.00	0.16	0.56

Table 3.2: Correlation and factor loadings of attitude measures (Study 2).

with other items. A new model was fit without this measure. This analysis found a two factor structure, which accounted for a combined 61% of the variance. The first factor consisted of the following items: ‘I think flossing daily is a good — bad idea’; ‘I think flossing daily is wise — foolish’; and ‘I think flossing daily is beneficial — detrimental’. It accounted for 35% of the variance. The second factor accounted for the other 26% of the variance and consisted of these items: ‘I think flossing daily is worthless — worthwhile’; ‘I think flossing daily is unnecessary - necessary’; and ‘My overall evaluation of flossing daily is positive - negative’. The factor analysis results appear in Table 3.2.

Two separate indexes reflecting the factor structure were created. The first index was based on ‘good’, ‘wise’, and ‘beneficial’ ratings, which could be interpreted as general knowledge measure. The second index was based on the ‘positive’, ‘worthwhile’, and ‘necessary’ ratings, which may be interpreted as a measure of personal belief. There was very little variation in the general knowledge scale across the message conditions, which is not surprising since most participants in this sample would have gained the knowledge growing up. Personal beliefs about whether flossing daily is necessary and worthwhile and overall judgment of it may be more subject to persuasive influence. The means pattern suggest this was the case (see Table 3.3), so I focus the analysis on the second scale.

Participants’ intention to floss was assessed by asking them to indicate how many days and the number of times they intended to floss over the next week. The average number of days and times reported were 3.2 (days) and 3.8 (times). These two measures are highly correlated ($r = 0.87$).

Delayed Measure of Attitude and Flossing Behavior

Attitude was measured again one week later. The same set of attitude items were used in this part. Flossing behavior was assessed by the number of days participants flossed, how many times they had flossed on each of those days, and the number of floss used since the day of the study. Participants were reminded of the day of the week that they had participated in the study, given a calendar of days since then, and asked to think for moment whether they had flossed on those days. On the next page of the questionnaire they then indicated whether they had flossed zero, once, twice, or more than twice in each of the days. Two scores were derived from this question: the number of days that participants flossed ($M = 2.8$) and the total number of times that they flossed ($M = 3.1$). These two scores are highly correlated ($r = 0.95$).

3.3 Results

The analysis detailed in the following sections employed a common approach to modeling the data. It begins with a simple model consisting of only the message effects. A second model was fit by adding the main effects of two known characteristics of the participants: gender and the number of times he or she had flossed during previous week. The effects estimated for the message variables were controlled for pre-existing differences due to participant's past flossing behavior and between men and women.

The analysis of variance models presented here used contrast coding for factors. Gender was coded as 1 for female and -1 for male. The regulatory focus of the message (variable: frame) was coded as 1 for prevention and -1 for promotion.

	Promotion Focus				Prevention Focus				
	Response Efficacy		Self-Efficacy		Response Efficacy		Self-Efficacy		
	Strong	Weak	Strong	Weak	Strong	Weak	Strong	Weak	
Thoughts T1 (M)	4.6	3.4	4.4	5.1	3.9	4.2	3.2	3.9	4.0
Thought T1 (M)	0.76	0.14	0.13	0.12	0.73	0.45	0.58	0.64	0.46
Thought T1 (SD)	0.39	0.79	0.71	0.63	0.49	0.68	0.58	0.39	0.63
Knowledge T1 (M)	6.78	6.53	6.72	6.48	6.73	6.77	6.27	6.46	6.59
Knowledge T1 (SD)	0.56	0.47	0.49	0.54	0.52	0.65	0.77	0.63	0.60
Attitude T1 (M)	6.33	5.76	5.51	5.94	6.18	5.88	5.39	5.77	5.84
Attitude T1 (SD)	0.73	1.09	1.01	0.79	0.71	1.20	1.22	0.86	1.00
Inention T1 (M)	3.53	4.13	2.38	3.27	4.07	3.44	2.59	2.38	3.24
Inention T1 (SD)	2.70	2.23	2.26	2.28	2.74	2.58	2.12	2.10	2.42
Behavior T1 (M)	1.80	2.13	1.31	1.55	2.67	2.50	1.53	0.62	1.80
Behavior T1 (SD)	3.43	2.75	2.43	2.54	3.58	3.86	2.12	1.19	2.88
Behavior T2 (M)	3.08	2.50	3.00	3.14	3.00	3.18	2.87	1.83	2.81
Behavior T2 (SD)	2.84	2.11	3.30	1.21	3.40	2.36	2.00	1.64	2.45
Attitude T2 (M)	5.78	5.53	5.60	5.43	5.95	5.85	5.53	5.08	5.61
Attitude T2 (SD)	1.25	0.99	0.77	0.76	1.09	1.12	1.05	1.39	1.08
NFC (M)	3.63	3.25	3.35	3.60	3.75	3.31	3.52	3.36	3.47
NFC (SD)	0.29	0.82	0.76	0.44	0.63	0.65	0.44	0.57	0.60
N	15	15	13	11	15	16	17	13	115
Female	10	11	5	8	9	9	4	4	60

Table 3.3: Dependent measures, need for cognition, and sample size as a function of message frame, message efficacy, and argument strength. Knowledge: rating on flossing is good, wise, and beneficial; Attitude: the extent to which participants held a positive evaluation of flossing daily and thought flossing daily is desirable; Thoughts: number of relevant thoughts listed; Thought: cognitive response positivity; NFC: Need for cognition.

The message efficacy (variable: efficacy) was coded as 1 for response efficacy and -1 for self-efficacy. The argument quality manipulation (variable: argument) was coded as 1 for strong and -1 for weak.

3.3.1 Attitude

Ratings from the three attitude items ('positive', 'worthwhile', and 'necessary') were standardized and averaged to create an attitude index (*Cronbach's* $\alpha = 0.76$). Analysis of variance models with this index as the dependent variable were fit according the procedure described previously.

The message effects only model ($F(7, 107) = 1.5$; $p = 0.17$; $R^2 = 0.09$; Adjusted $R^2 = 0.03$) found a main effect for message efficacy focus, $F(1, 107) = 4.23$, $p = .042$, indicating the the response efficacy message was on average led to more positive attitude than the self-efficacy message. This model also found a two-way interaction effect involving message efficacy focus and message strength $F(1, 107) = 4.96$, $p = .028$, indicating a difference in message strength effect between response and self-efficacy message conditions. The nature of this interaction will examined in detail in the context of regulatory frame manipulation and after controlling for pre-existing differences in gender and past flossing behavior. The predicted three-way interaction effect involving the message variables was not significant, $F(1, 107) = 0.19$, $p = 0.66$.

The message plus controls model ($F(9, 105) = 4.6$; $p = 0.000043$; $R^2 = 0.28$; Adjusted $R^2 = 0.22$) found two significant main effects: females responded more favorably to the flossing messages than males did $F(1, 105) = 13.85$, $p < .01$, and current flossers responded more favorably than non-flossers did $F(1, 105) = 11.23$,

$p < 0.01$. The main effect for message efficacy focus became nonsignificant $F(1, 105) = .05$, $p > .8$. No other main effects were significant at the .05 significance level.

	df	MS	F	p
gender	1	7.37	13.85	0.000
floss.t1	1	5.97	11.23	0.001
frame	1	0.03	0.05	0.821
efficacy	1	0.29	0.55	0.458
argument	1	0.12	0.23	0.631
frame * efficacy	1	0.03	0.05	0.817
frame * argument	1	0.47	0.88	0.350
efficacy * argument	1	2.60	4.88	0.029
frame * efficacy * argument	1	0.03	0.05	0.820
Error	105	0.53		

Table 3.4: Analysis of variance for attitude (Study 2).

Among the two-way interaction effects, the two-way interaction between message efficacy and message strength remained significant, $F(1, 105) = 4.88$, $p = .029$: the strong messages in the response efficacy message conditions led to more positive attitude than weak messages; whereas in the self-efficacy message conditions the weak messages led to more positive attitude than the strong messages. The predicted three-way interaction involving message efficacy, message regulatory frame, and argument quality was not significant, $F(1, 105) = .05$, $p > .80$. Details of the ANOVA model are found in Table 3.4.

The adjusted effects of message variables on attitude is presented in Figure 3.1. The pattern of attitude data was similar to the thought positivity data in study

Message frame, efficacy focus, and argument quality effect

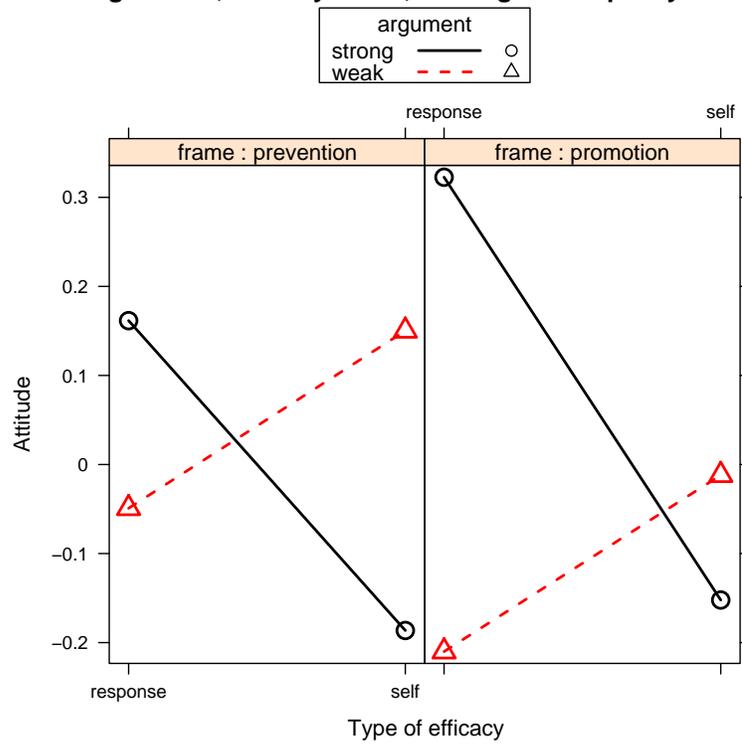


Figure 3.1: Attitude as predicted by the regulatory focus, type of efficacy focus, and argument quality of message (Study 2).

one. Participants who read the response efficacy message felt more positive about flossing daily when the message was strong but less positive when the message was weak. However this message scrutiny difference appeared to be larger when response efficacy was matched with promotion frame, which is contrary to what was predicted.

Another anomaly found in the attitude data was that the effect of message strength manipulation in the self-efficacy focus conditions. First the average attitude in the weak message conditions appeared to be more positive than that in the strong message conditions. Furthermore, this difference tended to be larger in the prevention condition than that in the promotion condition.

3.3.2 Cognitive Response Analysis

The average number of relevant thoughts generated in the matched condition ($M = 4.4$, $SD = 1.6$) was higher than that in the mismatched condition ($M = 3.8$, $SD = 1.6$). A t test found the difference to be significant at the .05 significance level, $t(112) = 2.0$, $p = .046$, and the 95% confidence interval was (0.01, 1.22). This result supports the hypothesis that matching the regulatory frame with efficacy focus increases the amount of cognitive elaboration.

The number of relevant negative thoughts listed by participants were compared between matched vs. mismatched conditions and between strong and weak argument conditions through a regression model, with number of negative thoughts as dependent variable, argument strength, matching, and their interaction as predictors. The model is significant, $F(1, 111) = 2.9$, $R^2 = 0.07$, Adjusted $R^2 = 0.05$, $p = .04$. The results indicate two simple effects for argument strength

and matching. Those who read the weak messages listed more negative thoughts than those who read the strong messages, $\beta = 0.22$, $se = 0.12$, $t(111) = 1.83$, $p = .07$. Those who read messages in which the regulatory frame was matched the efficacy focus also listed more negative thoughts, $\beta = 0.28$, $se = 0.12$, $t(111) = 2.26$, $p = .026$. The interaction between matching and argument strength was not significant, $t(111) = 0.01$, $p = .99$. The regression results are found in Table 3.5. The same analysis with the positive thoughts produced no significant effects at the .1 significance level.

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.13	0.12	9.17	0.000
matched1	-0.28	0.12	-2.26	0.026
argument1	-0.22	0.12	-1.83	0.070
matched1:argument1	0.00	0.12	0.01	0.992

Table 3.5: Number of negative thoughts regressed on matching condition, argument strength, and their interaction (Study 2). Note: matched1 = mismatch, argument1 = strong argument.

The thought positivity data was also examined. The scores were first fit with the message only analysis of variance model and then with the message effects plus control model. Two participants did not generate any thoughts and were excluded from analysis.

The message effects only model ($F(7, 105) = 2.9$; $p = 0.0074$; $R^2 = 0.16$; Adjusted $R^2 = 0.11$) resulted in a significant main effect for message regulatory frame $F(1, 105) = 7.6$, $p < .01$, indicating more positive cognitive response toward

the prevention framed message. The model also found a marginally significant effect for message strength, $F(1, 105) = 1.75$, $p = .059$, and a significant two-way interaction effect involving message strength and message efficacy focus $F(1, 105) = 2.10$, $p = .038$. The message strength manipulation had a larger effect in the response efficacy focus condition than in the self-efficacy focus condition. This interaction is examined again in the message effects plus control model. Finally, the predicted three-way interaction was not significant at the .1 significance level.

The message effects plus control model ($F(9, 103) = 3$; $p = 0.0031$; $R^2 = 0.21$; Adjusted $R^2 = 0.14$) found a significant main effect for flossing habit, $F(1, 103) = 4.6$, $p = .03$: those who were flossing already generated proportionally more positive thoughts than negative thoughts. Two simple effects were also significant. Those in the prevention framed message conditions generated more positive thoughts than those in the promotion framed message conditions, $F(1, 103) = 8.17$, $p < .01$. In addition, those in the strong message conditions generated more positive thoughts than those in the weak message conditions, $F(1, 103) = 3.89$, $p = .051$.

The predicted three-way interaction among the message variables was not statistically significant, $F(1, 103) = 0.25$, $p > .6$. The message efficacy by message strength two-way interaction remained significant ($p = 0.036$), and the message regulatory frame by message efficacy interaction was marginally significant ($p = 0.074$). See Table 3.6 for details.

These interactions were presented in Figure 3.2. The pattern of interactions was largely consistent with the interaction patterns found in the attitude data. It was also to some extent similar to the thought positivity data in study one (Figure

Message frame, efficacy focus, and argument quality effect

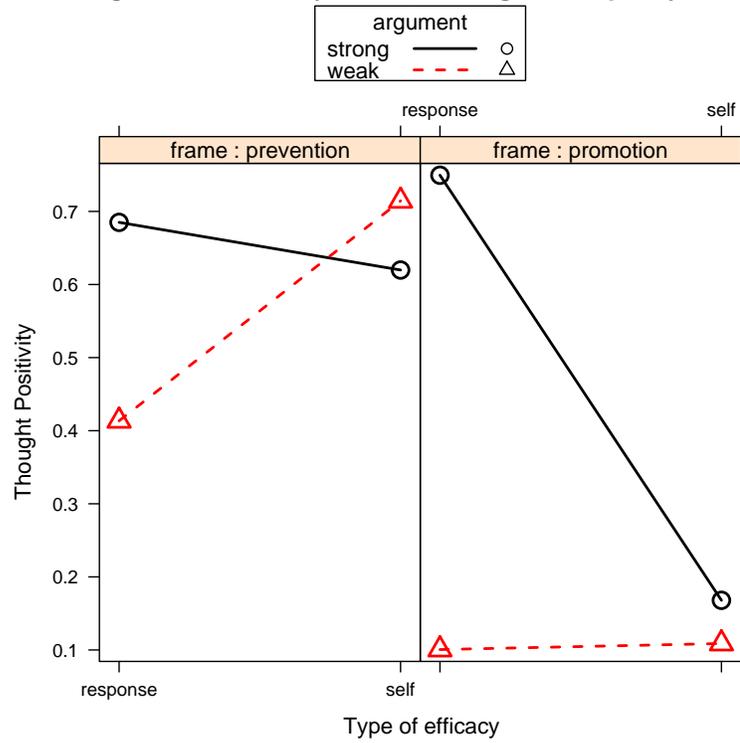


Figure 3.2: Thought positivity predicted from message variables, controlling for gender differences (Study 2).

	df	MS	F	p
gender	1	0.26	0.75	0.389
floss.t1	1	1.59	4.60	0.034
frame	1	2.83	8.17	0.005
efficacy	1	0.18	0.53	0.467
argument	1	1.35	3.89	0.051
frame * efficacy	1	1.13	3.26	0.074
frame * argument	1	0.48	1.40	0.240
efficacy * argument	1	1.57	4.53	0.036
frame * efficacy * argument	1	0.09	0.25	0.617
Error	103	0.35		

Table 3.6: Analysis of variance for thought positive index (Study 2)

2.2). When the message began with a prevention frame, the interaction between message efficacy and argument strength was in the direction predicted by the hypothesis that matching increase message elaboration: participants who read the response efficacy message distinguished the argument quality of the message by a large margin; whereas participants who read the self-efficacy message responded slightly more favorably to the weak message. When the message started with a promotion focus frame, however, the predicted pattern of interaction between message efficacy and argument quality was not found. In the promotion frame message conditions, all but the strong response efficacy message led to lower than average thought positivity.

3.3.3 Flossing Intention and Actual Behavior

The number of days that participants intended to floss during the next week was fitted to model two, controlling for the effects of gender and past flossing behavior.

The overall model is significant ($R^2 = 0.51$; Adjusted $R^2 = 0.47$; $F(9, 105) = 12$; $p < 0.01$), revealing two large main effects: gender and past flossing behavior. Females and existing flossers expressed higher intention to floss (p 's $< .05$). However none of the message related effects were significant at the .1 significance level.

Of the 115 participants who attended the lab session, 93 filled out the follow up questionnaire in which they reported the number of times they had flossed during the week after the lab study. A paired t test of the number of times that participants flossed during the weeks before and after persuasion revealed that on average participants flossed 1.4 times more after the persuasion, $t(92) = 7.3$, $p < 0.001$.

The number of days that participants flossed during the week after the experiment was fitted to the message effects plus control model. This model ($R^2 = 0.65$; Adjusted $R^2 = 0.61$; $F(9, 83) = 17$; $p < .01$) revealed a strong positive relationship between past flossing habit and flossing after the experiment. No other effects achieved statistical significance at the .1 significance level.

In summary, the results indicate that persuasive messages used in the study had no significant impact on either the behavioral intention and actual flossing behavioral. Instead these variables were mostly affected by gender and prior flossing habit.

3.3.4 Attitude and Cognitive Response Correlation.

Again to better understand the connection between regulatory focus/efficacy matching, cognitive response, and attitude, a regression model was fit with attitude as the dependent variable, gender, and the interaction between thought positivity index and whether message regulatory frame matched with message efficacy focus as predictors (see Figure 3.3).

The overall model ($R^2 = 0.26$; Adjusted $R^2 = 0.20$; $F(8, 104) = 4.6$; $p = 0.000084$) indicates a strong positive relationship between thought positivity and attitude, $t(104) = 3.87$, $\beta = .44$, $se = .11$, $p < .01$. A graph of the fitted regression lines by matching and argument strength is presented in graph. Differences between the slopes were not significant at .05 significance level.

3.3.5 Matching and Attitude Strength

Based on the hypothesis that matching between message frame and efficacy focus leads to greater message elaboration, I predicted that attitude change under matched conditions would be stronger than that under mismatched conditions. Thus it was expected that the relationship between cognitive response, attitude, intention, and behavior be larger under matched conditions vs. mismatched conditions. The correlation among these variables are found in Table 3.7.

From this table, it can be seen that intention and behavior are highly correlated under matched conditions ($r = .79$ when message was strong, and $r = .73$ when message was weak), whereas the correlation was weaker in the non-matched conditions ($r's = .59$ in both strong and weak message conditions).

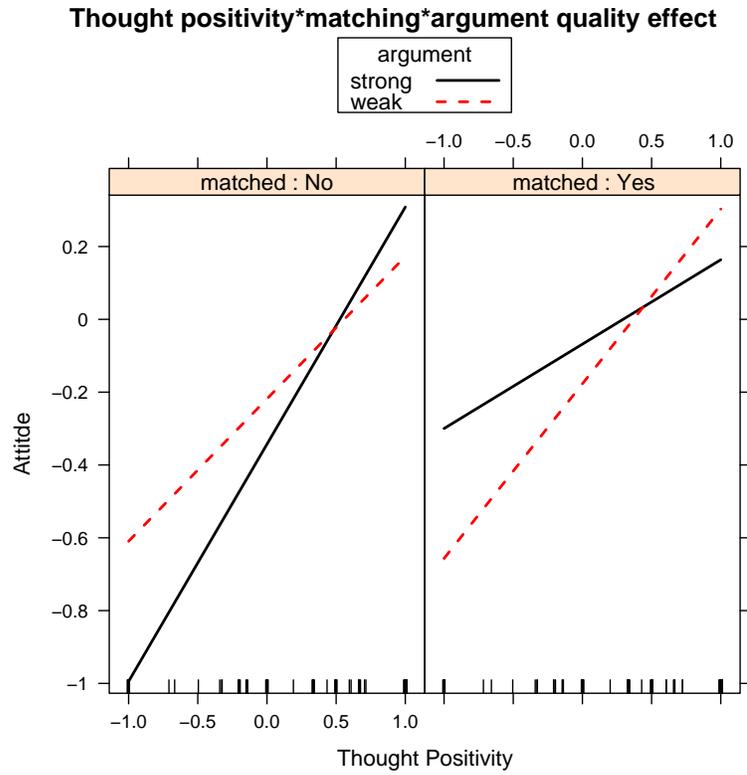


Figure 3.3: Attitude-cognitive response relationship as a function of match between regulatory frame and message efficacy focus and argument strength, controlled for gender (Study 2).

Strong Argument												
Measures	Matched					Mismatch						
	1	2	3	4	5	1	2	3	4	5		
1. Attitude T1	1.00					1.00						
2. Attitude T2	0.36	1.00				0.52	1.00					
3. Thought	0.38	0.49	1.00			0.29	0.45	1.00				
4. Intention	0.46	0.56	0.49	1.00		0.52	0.47	0.32	1.00			
5. Behavior	0.30	0.57	0.43	0.79	1.00	0.22	0.56	0.20	0.59	1.00		
Weak Argument												
Measures	Matched					Mismatch						
	1	2	3	4	5	1	2	3	4	5		
1. Attitude T1	1.00					1.00						
2. Attitude T2	0.47	1.00				0.51	1.00					
3. Thought	0.29	0.49	1.00			0.42	0.25	1.00				
4. Intention	0.63	0.40	0.45	1.00		0.66	0.35	0.35	1.00			
5. Behavior	0.45	0.26	0.01	0.73	1.00	0.43	0.16	0.08	0.59	1.00		

Table 3.7: Correlation among thought positivity, attitude (time 1 and time 2), intention, and actual behavior by regulatory frame/efficacy focus matching conditions, grouped by message strength conditions. Sample sizes: strong argument (matched = 28, mismatched = 32), weak argument (matched = 27, mismatched = 28).

Similarly thought positivity and intention correlation was larger under matched conditions ($r = .49$ when message was strong and $r = .45$ when message was weak) compared to that under mismatched conditions ($r = .32$ when message was strong and $r = .35$ when message was weak).

Thought positivity and behavior had stronger correlation under strong message conditions ($r = .43$ in matched condition and $r = .20$ in mismatched condition) than under weak message conditions ($r = .01$ in matched condition and $r = .08$ in mismatched condition), which makes intuitive sense. More importantly, when the message was strong, thought and behavior correlation was stronger when there was a match between message regulatory frame and message efficacy focus.

Table 3.8 shows the correlations among these variables between matched and mismatched conditions, averaged over the strong and weak message conditions. The correlation of immediate attitude as measured by semantic differential items with delayed attitude, thought positive, intention, and behavior between matched and mismatched conditions were about the same size. The rest of the correlations in the matched condition are all larger than those in the mismatched condition, suggesting better integrated attitude structure among individuals who have read the messages in which the frame and efficacy focus were matched.

3.4 Discussion

This study was set out to correct some potential confounds in study one and examine the effect of regulatory frame and efficacy focus matching on attitude, message elaboration, intention, as well as actual behavior. No statistically significant effects of message variables on intention and behavior were detected.

Measures	Matched					Mismatch				
	1	2	3	4	5	1	2	3	4	5
1. Attitude T1	1.00					1.00				
2. Attitude T2	0.41	1.00				0.52	1.00			
3. Thought	0.33	0.49	1.00			0.35	0.33	1.00		
4. Intention	0.52	0.50	0.47	1.00		0.57	0.41	0.31	1.00	
5. Behavior	0.33	0.46	0.29	0.77	1.00	0.31	0.39	0.17	0.59	1.00

Table 3.8: Correlation among thought positivity, attitude (time 1 and time 2), intention, and actual behavior by regulatory frame/efficacy focus matching conditions, collapsed over argument strength. Sample sizes: matched = 60, mismatched = 55.

Instead differences in these two variables were dominated by gender differences and past flossing behavior.

Study 2 partially replicated the results of message effects on cognitive response found in study 1. Individuals distinguished differences in message argument quality in the response efficacy messages, and the effect was larger when the message started with a promotion frame than a prevention frame. The message quality manipulation in self-efficacy messages appeared however to have no impact on cognitive response. Surprisingly the self-efficacy focused message led to more cognitive responses when the message began with a prevention focus even in the strong message condition.

The attitude data indicates mainly a two-way interaction effect involving efficacy focus and argument strength, in which strong argument led to more positive attitude in the response efficacy condition, but less positive attitude in the self-efficacy condition. This cross over interaction was not expected.

Overall, the data suggest that promotion framed strong response efficacy is likely to induce more positive cognitive response and attitude. This result is in agreement with research by Rothman and colleagues (Rothman & Salovey, 1997; Rothman, Martino, Bedell, Detweiler, & Salovey, 1999) who have demonstrated that positively framed messages are more effective in persuading people to perform prevention oriented health behavior, such as flossing.

Study 2 also provides some initial evidence that matching between the regulatory frame of a message and the efficacy information can lead to stronger attitudes. It was found that cognitive response, intention, and behavior were more

consistent with one another when there was a match rather than a mismatch between frame and efficacy focus of a message.

CHAPTER 4

DISCUSSION

4.1 Review and Summary

A large body of literature in health communication has emphasized the role of response efficacy and self-efficacy in convincing people to engage in behavioral change. However little research has been done to understand how these two sources of information could be combined with other message features to increase the persuasive impact of communication.

The current investigation started with the assumption that individuals differ in the strength of their reaction to response efficacy and self-confidence in controlling their own behavior, and that such differences can be affected by salient self-regulatory focus. When a person's salient focus of self-regulation shifts from promotion to prevention, his/her sensitivity to response efficacy information decreases whereas the sensitivity to self-efficacy information increases. On the other hand, when a person's salient regulatory goal shifts from prevention to promotion, his/her sensitivity to response efficacy information decreases and sensitivity to self-efficacy information increases. This assumption was based on earlier research by Shah and Higgins (2007), Pham and Avnet (2004), and Keller (2006). The

conjecture implies that when designing health communication messages regulatory framing and efficacy information can be matched to achieve greater persuasion.

This hypothesis was tested in the context of persuading college students to floss teeth every day, using message quality manipulation and cognitive response analysis as methodological tools to understand the attitude change process. These methodologies have long been used by persuasion researchers (Petty & Cacioppo, 1986, ELM) to make inferences of the underlying cognitive processes of persuasion effects.

Differences in self regulatory focus was experimentally manipulated by framing flossing daily as a behavior to promote fresh breath or a behavior to prevent bad breath. Two types of information followed the initial framing of the behavioral goal, one that emphasizes the effectiveness of flossing as a way to reach the goal (response efficacy focus), and the other emphasizes the steps one can adopt to achieve the outcome (self-efficacy focus). These manipulations created two matched conditions (promotion frame/self-efficacy focus and prevention frame/response efficacy focus) and two mismatched conditions (promotion frame/response efficacy focus and prevention frame/self-efficacy focus).

To detect the differences in response intensity and message related information processing, strong and weak versions of the same message were created. It was predicted that when prevention focus was made salient, participants were more likely to distinguish the quality differences in the response efficacy message; whereas when promotion focus was made salient they would be more likely to distinguish the quality differences in the self efficacy message. In addition, it was predicted that attitude formed when prevention regulatory frame was matched with

response efficacy or promotion frame was matched with self-efficacy information should be more persistent and more impactful on behavior.

Two experiments involving a total of 295 participants were conducted to test the hypothesis. Argument quality manipulation of message strength and cognitive response analysis were used to understand how matching changes the quantity and nature of cognitive elaboration of message content.

Study 1 used a strong manipulation of regulatory focus. Participants in the prevention message frame were first given prevention type of slogans to comment on and those in the promotion message frame were given promotion type of slogans. They also generated up to three of their own slogans. After reading the health messages, participants listed cognitive responses and then reported attitude toward flossing daily.

The predicted effect of matching on persuasion did not materialize when the message focuses on self-efficacy. The cognitive response data indicate that self-efficacy focused messages did not get differential amount of cognitive elaboration whether the message began with a promotion or a prevention frame (Figure 2.2). In the attitude data, the argument quality manipulation of self-efficacy focused messages did not produce significant differences in either the prevention or promotion frame conditions. However, a strong negative reaction to the self-efficacy message appeared in the promotion frame (Figure 2.1). Participants felt more negative about flossing daily and found it less desirable regardless of the relevance of pictures used and the amount of details in the flossing instructions when the message began with a promotion frame compared to the more positive attitudes when the message began with a prevention frame. It is not clear how this

discrepancy between the cognitive response and attitude data emerged in the self-efficacy focused messages.

It was predicted that when the message focuses on response efficacy the attitude and cognitive response should exhibit greater differences in the prevention frame condition than those in the promotion condition. The attitude data did show greater attitude differences when response efficacy focused message began with a prevention frame than when it began with a promotion frame, however the reverse pattern was found in the cognitive response data.

Thus the results from study 1 did not provide support for the hypothesis that matching message regulatory frame with message efficacy focus increases objective message elaboration. Further analysis of the data using need for cognition as a moderating variable did not produce a significant four-way interaction effect among need for cognition, message frame, message focus, and argument strength, even though the raw data suggest that the need for cognition individuals might have been more susceptible to the influence of matching.

Some confounding factors made straight interpretation of the results from study 1 difficult. Of most concern was the fact that relevant and irrelevant pictures were used in the self-efficacy messages as one way to differentiate the message quality. This might have drawn disproportional attention to the pictures and caused the matching manipulation to be ineffective. Study one also used a rather strong manipulation of prevention and promotion focus, which could have also led to awareness of the manipulation in the message frame.

Study 2 got rid of the potential confounding factors of study 1. It used the same experimental design, but the self-efficacy messages underwent significant

revisions. The strong message emphasized that flossing daily is easy, gave practical suggestions on how to build flossing into a daily routine, and assured participants that gum bleeding was only temporary. The weak message emphasized that flossing daily would take time and effort, gave suggestions that made flossing daily appeared to be more time consuming, and offered less assurance about gum bleeding. In addition to the attitudinal and cognitive response measures, study 2 also measured behavioral intention and participants' actual flossing behavior before and after the persuasion.

Participants in this study were more critical of the self-efficacy message when it began with a promotion frame compared to when it began with a prevention frame. This effect is more pronounced in the cognitive response data than that in the attitude data (Figure 3.1 and Figure 3.2). The attitude data also suggested that the weak version of the self-efficacy message might be more persuasive than the strong version. A result that was not expected beforehand.

The results of pairing response efficacy with prevention or promotion frames led to similar results as those of study 1. Participants paid more attention to the message quality differences when the message began with a promotion frame, more than they did when the message began with a prevention frame. This pattern was found both in the cognitive response data and the attitude data, which was inconsistent with my earlier prediction.

The attitude and thought positivity data thus did not provide support for the hypothesis that matching message regulatory frame and efficacy focus increases objective message elaboration which should be consistent with the quality of the message. Study 2 however did find some evidence that matching message regulatory

frame and message efficacy focus increases the amount of cognitive elaboration. It was found in this study that participants generated more thoughts when the regulatory frame matches with efficacy focus. However the data also suggest that the increase in cognitive elaboration was mainly due to the increase of negative thoughts rather than an increase of positive thoughts. This indicates that when there is match between regulatory frame and message efficacy focus, individuals are more likely to counter-argue with the advocated position.

Analysis of the behavioral intention data and actual flossing data did not find significant message related effects, though there was a significant increase in flossing behavior after the persuasion.

Finally Study 2 found some evidence that matching regulatory frame and regulatory focus can lead to stronger attitudes (Table 3.8). The correlations among cognitive response, attitude, intention, and behavior were higher when there was a match between efficacy focus and the regulatory frame of the message.

So overall across two studies matching regulatory frame and efficacy focus did not lead to more persuasion. Some evidence was found that matching did increase the amount of message related cognitive elaboration, but the nature of the increased elaboration was mostly counter-argumentation. In addition, the findings suggest that the counter-argumentation process may help bolster the strength of attitudes.

4.2 Implication for Health Message Design

The studies found that promotion frame, rather than prevention frame had a larger effect on message scrutiny when it comes to response efficacy. Except for the

attitude data in study one, message quality differences were picked up more by participants in promotion frame/response efficacy message conditions.

This effect could be an experimental artifact, but I think it reveals something more substantively interesting. It is an experiment artifact if the promotion focused strong response efficacy message was better written with better quality arguments than the prevention focused strong response efficacy message and the promotion focused weak response efficacy message was poorly written with lower quality arguments than the prevention focused weak response efficacy message. If the strong and weak response efficacy manipulation were not equally strong (or weak), it could lead to such a result. This looked like to be the case in study 2. For example, participants in the promotion frame rated the response efficacy message to be stronger than those in the prevention frame condition. However it was not the case in study 1. In that study the differences in message strength rating were similar in prevention and promotion conditions. This was also not the case in another study that was done for a different purpose. There the argument strength rating difference between strong and weak argument quality messages is smaller in the promotion than that in the prevention condition, however the cognitive response and attitude data still showed greater message scrutiny in the promotion/response efficacy message condition than that in the prevention/response efficacy condition. This suggests that the heightened level of message scrutiny when the message featured a promotion frame may be real effects.

If the difference is genuine, then it fits well with Shah and Higgins' (1997) finding that promotion focused individuals were more likely to use expectancy-value rule in judgment when the value of a goal is high. For promotion focused

individuals, maximizing gains is more motivating than minimizing losses. High vs. low outcome expectancy is thus very important given the value is fixed and consequential. For prevention focused individuals, the expectancy-value rule is less likely to be used, because for them avoiding losses is a necessity, something that you have to do, regardless of the chances of actually getting the reward. Thus, response efficacy matters less because the prevention focus has already been activated. This point was also backed up by the overall pattern of results in the prevention frame condition. Regardless of efficacy manipulation, attitude and cognitive response tend to be more positive on average in the prevention frame compared to those in the promotion frame. This suggests that when participants were primed with a prevention regulatory focus, flossing became more like an obligation or responsibility to be performed regardless of the type of efficacy information supporting the proposal. It is the right thing to do and even the argument quality of the message became not as important as it would be if the person was in the mode of promotion orientation.

A practical implication of this result is that a safe bet for effective health communication message design is to start with a prevention frame, but when a promotion frame is used it should be backed up with strong response efficacy focused information.

The finding that participants generated more negative thoughts when there was a match between regulatory frame and efficacy focus suggests that tailored messages targeting individuals at different psychological states should be done carefully as it can increase counter argumentation. In addition, such counter argumentation process can bolster attitude strength. It was found in study two that

cognitive response, intention, and behavior were structurally better integrated when there was a match rather than a mismatch between message regulatory frame and message efficacy focus. Together these results suggest that when messages are designed poorly, matching not only leads to more counter argumentation, but also stronger and more impactful negative attitudes.

4.3 Limitation and Future Research

One of the major disappointments of the current investigation was the failure of self-efficacy message strength manipulation. Although the manipulation of self-efficacy was revised with input from focus group participants and was consistent with manipulations done by other researchers (Rippetoe & Rogers, 1987; Kline & Mattson, 2000; Keller, 2006), the message strength ratings did not match the intended strength manipulation. In addition, similarly worded self-efficacy messages fared much worse in the promotion frame conditions.

Future research should try to understand why this was the case. One possibility is that the participants in the studies already possess the knowledge, skills, and self confidence in performing the recommended flossing behavior, thus not only is it difficult to change their self-efficacy in this domain, it may also make them feel being treated less as an educated adult. Furthermore, few people may find the concrete suggestions on how to make flossing daily easy applicable to themselves. Both of these could have made the attempt to change self-efficacy through verbal persuasion a difficult task. Bandura (1977) pointed out several other ways to change self-efficacy, such as performance accomplishments and vicarious experience. Future research should explore these other methods to change self-efficacy.

In this study I used persuading college students to floss daily as a context to test the hypothesis of matching on persuasion. Future research should be conducted on different population and use different contexts. Matching message regulatory frame and message efficacy may be more effective for persuasion in domains where the target has not already formed an attitude or the attitude is more malleable.

4.4 Conclusion

The current investigation did not replicate a previously reported finding that matching message regulatory frame and efficacy focus information increases persuasion. The research did find that matching these concepts in the same message increased the amount of cognitive elaboration, in the form of more counter-arguing with the advocated position. The studies also found evidence that attitudes are structurally stronger and more consistent when the change was induced when message regulatory frame matches with message efficacy focus.

APPENDIX A

STUDY 1 MESSAGE STIMULI

The eight versions of the flossing message used in study 1 are found on the next eight pages. They are set in the following order:

1. Promotion focus, response efficacy, strong argument message.
2. Promotion focus, response efficacy, weak argument message.
3. Promotion focus, self efficacy, strong argument message.
4. Promotion focus, self efficacy, weak argument message.
5. Prevention focus, response efficacy, strong argument message.
6. Prevention focus, response efficacy, weak argument message.
7. Prevention focus, self efficacy, strong argument message.
8. Prevention focus, self efficacy, weak argument message.

Sweet Breath, Healthy Gums only a Floss Away

Dentists recommend flossing as essential for promoting healthy teeth and great breath

Imagine opening up your mouth to kiss that special someone, to have the person of your dreams smile and say, "Wow -- what breath!"

According to dentists, the most reliable way to promote great breath, in addition to brushing twice a day, is to floss your teeth daily.

"Flossing your teeth daily removes particles of food in the mouth and stops bacteria growth", reports Dr. Strathman at the OSU College of Dentistry.

"If you are only brushing and not flossing, you're only cleaning 60 percent of the surface of your teeth." Dr. Strathman says, "Bacteria can still grow between your teeth and that can cause you to lose the fresh breath that you used to have."

In addition, flossing keeps your gums healthy. Healthy gums help people maintain their teeth long into adulthood. Without regular flossing, plaque, a sticky film of bacteria that constantly forms on the teeth can damage the gums.

Flossing eliminates bacteria and keeps gums their normal pink color, and well-flossed gums rarely bleed from flossing.

Regular and correct flossing is the best way to promote healthy gums and teeth.

You'll notice the difference. Start flossing today!

Code: A

PMRS

Sweet Breath, Healthy Gums only a Floss Away

Dental patients recommend flossing as one way to promote healthy teeth and better breath

Imagine opening up your mouth to kiss that special someone, to have the person of your dreams smile and say, "Wow -- what breath!"

According to many dental patients, one way to promote great breath is to floss your teeth regularly.

As regular flosser Suzanne Browning reports: "Before I started flossing, my teeth and breath were really bad. But now, my breath is somewhat better and my teeth don't feel as bad."

Suzanne also says that "if you are only brushing and not flossing, you are missing the chance to spend more time on your dental care. "

In combination with regular brushing, flossing can help you relax to a greater degree.

There are many other benefits to flossing as well. Many people report that flossing helps them develop dexterity and coordination in their fingers.

Some people note that they are able to save money on toothpaste and toothbrushes when they start flossing regularly.

You'll notice the difference. Start flossing today!

Code: B

PMRW

Sweet Breath, Healthy Gums only a Floss Away

Dentists recommend flossing as essential for promoting healthy teeth and great breath

Imagine opening up your mouth to kiss that special someone, to have the person of your dreams sigh and say, "Wow -- what breath!"

You can do it!

You can achieve this scenario if you floss at least once a day. Flossing is easy and you can do it by following these steps:



Wind about 18 inches of floss around middle fingers of each hand. Pinch floss between thumbs and index fingers, leaving a 1-2 inches length in between.



Hold the floss tightly between your thumbs and index fingers and gently guide floss between the teeth by using a sawing motion.

When the floss reaches the gumline, curve it into a "C"-shape against one tooth. Gently slide it into the space between the gum and the tooth until you feel resistance.



Hold the floss tightly against the tooth. While still keeping the pressure of the floss up against the tooth's surface (not on the gum tissue) slide the dental floss up and down the side of the tooth both above and especially below the gum line.

Once you have finished cleaning the side of this first tooth you will need to bring the floss back above the gum line, pull it up against the side of the other tooth, and then clean the second tooth just like you did the first one.

You can do it! Start flossing today.

Code: C

PMSS

Sweet Breath, Healthy Gums only a Floss Away

Dentists recommend flossing as essential for promoting healthy teeth and great breath

Imagine opening up your mouth to kiss that special someone, to have the person of your dreams smile and say, "Wow -- what breath!"

You can do it!

You can achieve this scenario if you floss at least once a day. Flossing is easy and you can do it by following these steps:



Get about 18 inches of floss and put it around the middle fingers of each hand. Carefully hold the floss between thumbs and index fingers, leaving 1-2 inches length in between.



While holding the floss, gently guide it between the teeth by using a sawing motion being careful to not hurt the gum.

You should slide the floss against a tooth.



While still holding the floss, move it up and down again the surface of the tooth. Continue to do this a few times.

Once you have finished cleaning the side of this first tooth you will need to bring the floss back above the gum line, pull it up against the side of the other tooth, and then clean the second tooth just like you did the first one.

You can do it! Start flossing today.

Code: D

PMSW

Floss Now or Forever Hold your Breath

Dentists recommend flossing as essential for preventing bad breath and gum disease.

Imagine opening up your mouth to have your teeth cleaned, only to have the dental hygienist groan and say, "Wow -- what breath!"

According to dentists, the most reliable way to avoid bad breath, in addition to brushing twice a day, is to floss your teeth regularly.

"If you don't floss your teeth daily, particles of food remain in your mouth, collecting bacteria that cause bad breath", reports Dr. Strathman at the OSU College of Dentistry.

Dr. Strathman also says: "If you are only brushing, and not flossing, you're only cleaning 60 percent of the surface of your teeth. Bacteria can still grow between your teeth."

Gum disease is an infection of the tissues surrounding and supporting the teeth. It is a major cause of tooth loss in adults. Because gum disease is usually painless, however, you may not know you have it.

Gum disease is caused by plaque, a sticky film of bacteria that constantly forms on the teeth.

These bacteria create toxins that can damage the gums. In the early stages of gum disease, the gums become red, swollen, and bleed easily. In more advanced stages of gum disease, the gums and bone that support the teeth can become seriously damaged.

Regular and correct flossing is the best way to avoid bad breath and periodontal disease.

You'll notice the difference. Start flossing today!

Code: E

PVRS

Floss Now or Forever Hold your Breath

Dental patients recommend flossing as one way to prevent bad breath and gum disease.

Imagine opening up your mouth to have your teeth cleaned, only to have the dental hygienist groan and say, "Wow -- what breath!"

According to some dental patients, one way to avoid bad breath is to floss your teeth regularly.

As regular flosser Suzanne Browning reports: "If you don't floss your teeth daily, particles of food could remain in your mouth, collecting bacteria that might cause bad breath."

Suzanne also says that "if you are only brushing and not flossing, you are missing the chance to spend more time on your dental care."

Gum disease is an infection of the tissues surrounding and supporting the teeth. It is a major cause of tooth loss in adults. Because gum disease is usually painless, however, you may not know you have it.

When you don't brush and floss your teeth regularly you are missing the chance to spend time on your own healthcare.

There are many other downsides to not flossing as well. Many people find that when they don't floss regularly they notice a loss of dexterity and coordination in their fingers.

Some people note that they have to spend more money on toothpaste and toothbrushes when they don't floss their teeth more regularly.

You'll notice the difference. Start flossing today!

Code: F

PVRW

Floss Now or Forever Hold your Breath

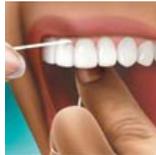
Dentists recommend flossing as essential for preventing bad breath and gum disease

Imagine opening up your mouth to have your teeth cleaned, only to have the dental hygienist groan and say, "Wow -- what breath!"

You can avoid that scenario if you floss at least once a day. Flossing is easy and you can do it by following these steps:



Wind about 18 inches of floss around middle fingers of each hand. Pinch floss between thumbs and index fingers, leaving a 1-2 inches length in between.



Hold the floss tightly between your thumbs and index fingers and gently guide floss between the teeth by using a sawing motion.

When the floss reaches the gumline, curve it into a "C"-shape against one tooth. Gently slide it into the space between the gum and the tooth until you feel resistance.



Hold the floss tightly against the tooth. While still keeping the pressure of the floss up against the tooth's surface (not on the gum tissue) slide the dental floss up and down the side of the tooth both above and especially below the gum line.

Once you have finished cleaning the side of this first tooth you will need to bring the floss back above the gum line, pull it up against the side of the other tooth, and then clean the second tooth just like you did the first one.

You can do it! Start flossing today.

Code: G

PVSS

Floss Now or Forever Hold your Breath

Dentists recommend flossing as essential for preventing bad breath and gum disease

Imagine opening up your mouth to have your teeth cleaned, only to have the dental hygienist groan and say, "Wow -- what breath!"

You can avoid that scenario if you floss at least once a day. Flossing is easy and you can do it by following these steps:



Get about 18 inches of floss and put it around the middle fingers of each hand. Carefully hold the floss between thumbs and index fingers, leaving 1-2 inches length in between.



While holding the floss, gently guide it between the teeth by using a sawing motion being careful to not hurt the gum.

You should slide the floss against a tooth.



While still holding the floss, move it up and down again the surface of the tooth. Continue to do this a few times.

Once you have finished cleaning the side of this first tooth you will need to bring the floss back above the gum line, pull it up against the side of the other tooth, and then clean the second tooth just like you did the first one.

You can do it! Start flossing today.

Code: H

PVSW

APPENDIX B

STUDY 2 MESSAGE STIMULI

The eight versions of the flossing message used in study 2 and study 3 are found on the next eight pages. In study two, the message were presented on the computer as Powerpoint slideshows.

They are set in the following order:

1. Promotion focus, response efficacy, strong argument message.
2. Promotion focus, response efficacy, weak argument message.
3. Promotion focus, self efficacy, strong argument message.
4. Promotion focus, self efficacy, weak argument message.
5. Prevention focus, response efficacy, strong argument message.
6. Prevention focus, response efficacy, weak argument message.
7. Prevention focus, self efficacy, strong argument message.
8. Prevention focus, self efficacy, weak argument message.

Fresh Breath, Healthy Gums only a Floss Away

*Dentists recommend flossing daily
to promote healthy teeth and great breath*

Imagine opening your mouth to kiss that special someone, to have the person of your dreams smile and say, "Wow -- what fresh breath!"

You can achieve naturally fresh breath if you floss every day. According to dentists, the most reliable way to promote great breath, in addition to brushing twice a day, is to floss your teeth daily.

"Flossing your teeth daily removes particles of food in the mouth and stops bacteria growth", reports Dr. Strathman at the OSU College of Dentistry.

"If you are only brushing and not flossing, you're only cleaning 60 percent of the surface of your teeth." Dr. Strathman says, "Bacteria can still grow between your teeth and produce volatile sulphur compounds, a group of gases that cause you to lose the fresh breath that you normally would have."

In addition, flossing keeps your gums healthy. Healthy gums help people maintain their teeth long into adulthood. With daily flossing, plaque, a sticky film of bacteria that constantly forms on the teeth will be removed before it starts to damage the gums.

Well-flossed gums have their healthy normal pink color and rarely bleed from flossing.

Regular and correct flossing is the best way to promote fresh breath and healthy teeth.

You'll notice the difference. Start flossing today!

Fresh Breath, Healthy Gums only a Floss Away

*Dental patients recommend flossing daily
to promote healthy teeth and better breath*

Imagine opening your mouth to kiss that special someone, to have the person of your dreams smile and say, "Wow -- what fresh breath!"

You can achieve naturally fresh breath if you floss every day. According to many dental patients, one way to promote great breath, in addition to brushing twice a day, is to floss your teeth daily.

"Before I started flossing, my teeth and breath were really bad. But now, my breath is somewhat better and my teeth don't feel as bad," reports regular flosser Suzanne Browning.

"Flossing your teeth daily removes particles of food in the mouth and may slow bacteria growth and the development of gum disease." Suzanne says, "If you are only brushing and not flossing, you are missing the chance to spend more time on your dental care. "

In addition, Suzanne notes that in combination with regular brushing, flossing helps her relax to a greater degree.

There are many other benefits to flossing as well. Many people report that flossing helps them develop dexterity and coordination in their fingers.

Some people note that they are able to save money on toothpaste and toothbrushes when they start flossing regularly.

Regular and correct flossing can help promote fresh breath and healthy teeth.

You'll notice the difference. Start flossing today!

Fresh Breath, Healthy Gums only a Floss Away

*Dentists recommend flossing daily
to promote healthy teeth and great breath*

Imagine opening your mouth to kiss that special someone, to have the person of your dreams smile and say, "Wow -- what fresh breath!"

Yes, you can achieve naturally clean breath if you floss every day. Flossing is easy and takes just a few minutes a day. You can do it!

First, make sure that you have dental floss when you need it. Place a pack of dental floss in the bathroom close to your tooth brush and keep one in your bag when you go to school. It's much easier to include flossing in your daily routine when the dental floss is readily available.

Second, don't be afraid if your gums bleed when you first start flossing. It is normal to see some bleeding at first if you have not flossed in a while. The bleeding will stop in a few days after you've flossed several times.

Third, practice your flossing skills. Remember, flossing is as simple as 1-2-3:

1. Wind about 18 inches of floss around middle fingers of each hand. Hold the floss between thumbs and index fingers, leaving a 1-2 inches length in between.
2. While holding the floss, gently guide it between the teeth by using a sawing motion.
3. Slide the floss into the space between the gum and the tooth until you feel resistance and then move the dental floss up and down against the surface of the tooth.

Once you have finished cleaning the side of this first tooth, bring the floss back above the gum line and clean the side of the other tooth ---- simple as that!

Next time when you brush your teeth before bedtime, take out the floss and start flossing. Remember, fresh breath and healthy teeth are only a floss away.

Floss Daily!

You can do it. Start today.

Fresh Breath, Healthy Gums only a Floss Away

*Dentists recommend flossing daily
to promote healthy teeth and great breath*

Imagine opening your mouth to kiss that special someone, to have the person of your dreams smile and say, "Wow -- what fresh breath!"

Naturally clean breath can be achieved if the teeth are flossed every day. Flossing everyday takes time, skill, and effort but you should be able to do it by following these steps:

First, make sure that you don't forget about flossing everyday. You can remind yourself to floss by marking off ten minutes on your calendar for each day at the beginning of each week. It's difficult to include flossing in your daily routine when you can't remember to floss everyday.

Second, don't be afraid of the bleeding from your gums when you floss. It is normal to see your gum bleed if you have not flossed in a while, and even people who floss regularly can sometimes hurt their gums and cause them to bleed.

Third, practice your flossing skills in front a mirror. Incorrect flossing may actually damage your gums. Follow these instructions when you floss.

1. Wind about 18 inches of floss around middle fingers of each hand. Pinch floss between thumbs and index fingers, leaving a 1-2 inches length in between.
2. Hold the floss tightly between your thumbs and index fingers and gently guide floss between the teeth by using a sawing motion. When the floss reaches the gumline, curve it into a "C"-shape against one tooth. Gently slide it into the space between the gum and the tooth until you feel resistance.
3. Hold the floss tightly against the tooth. While still keeping the pressure of the floss up against the tooth's surface (not on the gum tissue) slide the dental floss up and down the side of the tooth both above and especially below the gum line.
4. Once you have finished cleaning the side of this first tooth, bring the floss back above the gum line and clean the side of the other tooth. Continue flossing until every tooth, top and bottom, are cleaned thoroughly.

Next time when you brush your teeth before bedtime, take out the floss and start flossing.

**Floss daily!
It can be done. Start today.**

Floss Now or Forever Hold your Breath

*Dentists recommend flossing daily
to prevent bad breath and gum disease*

Imagine opening up your mouth to have your teeth cleaned, only to have the dental hygienist groan and say, "Wow -- what breath!"

You can avoid bad breath and gum disease by flossing every day. According to dentists, the most reliable way to avoid bad breath, in addition to brushing twice a day, is to floss your teeth daily.

"If you don't floss your teeth daily, particles of food remain in your mouth, causing bacteria growth," reports Dr. Strathman at the OSU College of Dentistry.

"If you are only brushing, and not flossing, you're only cleaning 60 percent of the surface of your teeth." Dr. Strathman says, "Bacteria can still grow between your teeth and produce volatile sulphur compounds, a group of gases that cause you to get bad breath which you normally would not have."

In addition, not flossing regularly can lead to gum disease. This is a major cause of tooth loss in adults. Without daily flossing, plaque, a sticky film of bacteria that constantly forms on the teeth will create toxins that damage the gums and the bones that support the teeth.

Infected gums may become red, swollen, and bleed easily. Because gum disease is usually painless, however, you may not know you have it.

Regular and correct flossing is the best way to avoid bad breath and periodontal disease.

You'll notice the difference. Start flossing today!

Floss Now or Forever Hold your Breath

Dental patients recommend flossing daily to prevent bad breath and gum disease.

Imagine opening up your mouth to have your teeth cleaned, only to have the dental hygienist groan and say, "Wow -- what breath!"

You can avoid bad breath and embarrassment by flossing every day. According to some dental patients, one way to avoid bad breath is to floss your teeth regularly.

"Before I started flossing, my teeth and breath were really bad. But now, my breath is somewhat better and my teeth don't feel as bad," reports regular flosser Suzanne Browning.

"If you don't floss your teeth daily, particles of food may remain in the mouth, which could cause bacterial growth and the development of gum disease." Suzanne says, "If you are only brushing and not flossing, you are missing the chance to spend more time on your dental care."

In addition, Suzanne notes that in combination with regular brushing, flossing helps her feel less tense.

There are many other downsides to not flossing as well. Many people find that when they don't floss regularly they notice a loss of dexterity and coordination in their fingers.

Some people note that they have to spend more money on toothpaste and toothbrushes when they don't floss their teeth more regularly.

Regular and correct flossing can help prevent bad breath and teeth decay.

You'll notice the difference. Start flossing today!

Floss Now or Forever Hold your Breath

*Dentists recommend flossing daily
to prevent bad breath and gum disease*

Imagine opening up your mouth to have your teeth cleaned, only to have the dental hygienist groan and say, "Wow -- what breath!"

Yes, you can avoid bad breath and gum disease by flossing every day. Flossing is easy and takes just a few minutes a day. You can do it!

First, make sure that you have dental floss when you need it. Place a pack of dental floss in the bathroom close to your tooth brush and keep one in your bag when you go to school. It's much easier to include flossing in your daily routine when the dental floss is readily available.

Second, don't be afraid if your gums bleed when you first start flossing. It is normal to see some bleeding at first if you have not flossed in a while. The bleeding will stop in a few days after you've flossed several times.

Third, practice your flossing skills. Remember, flossing is as simple as 1-2-3:

1. Wind about 18 inches of floss around middle fingers of each hand. Hold the floss between thumbs and index fingers, leaving a 1-2 inches length in between.
2. While holding the floss, gently guide it between the teeth by using a sawing motion.
3. Slide the floss into the space between the gum and the tooth until you feel resistance and then move the dental floss up and down against the surface of the tooth.

Once you have finished cleaning the side of this first tooth, bring the floss back above the gum line and clean the side of the other tooth ---- simple as that!

Next time when you brush your teeth before bedtime, take out the floss and start flossing. Remember, bad breath and gum disease can be avoided.

Floss Daily!

You can do it. Start today.

Floss Now or Forever Hold your Breath

*Dentists recommend flossing daily
to prevent bad breath and gum disease*

Imagine opening up your mouth to have your teeth cleaned, only to have the dental hygienist groan and say, "Wow -- what breath!"

Bad breath and gum disease can be avoided by flossing every day. Flossing everyday takes time, skill, and effort but you should be able to do it by following these steps:

First, make sure that you don't forget about flossing everyday. You can remind yourself to floss by marking off ten minutes on your calendar for each day at the beginning of each week. It's difficult to include flossing in your daily routine when you can't remember to floss everyday.

Second, don't be afraid of the bleeding from your gums when you floss. It is normal to see your gum bleed if you have not flossed in a while, and even people who floss regularly can sometimes hurt their gums and cause them to bleed.

Third, practice your flossing skills in front a mirror. Incorrect flossing may actually damage your gums. Follow these instructions when you floss.

1. Wind about 18 inches of floss around middle fingers of each hand. Pinch floss between thumbs and index fingers, leaving a 1-2 inches length in between.
2. Hold the floss tightly between your thumbs and index fingers and gently guide floss between the teeth by using a sawing motion. When the floss reaches the gumline, curve it into a "C"-shape against one tooth. Gently slide it into the space between the gum and the tooth until you feel resistance.
3. Hold the floss tightly against the tooth. While still keeping the pressure of the floss up against the tooth's surface (not on the gum tissue) slide the dental floss up and down the side of the tooth both above and especially below the gum line.
4. Once you have finished cleaning the side of this first tooth, bring the floss back above the gum line and clean the side of the other tooth. Continue flossing until every tooth, top and bottom, are cleaned thoroughly.

Next time when you brush your teeth before bedtime, take out the floss and start flossing.

**Floss daily!
It can be done. Start today.**

APPENDIX C

STUDY 2 MESSAGE DISPLAY EXAMPLE

An example of how participants viewed the promotion focused, response efficacy, and strong argument message is shown on the next four pages. The messages were displayed as full screen Powerpoint slide shows in the actual study.

Fresh Breath, Healthy Gums only a Floss Away

Dentists recommend flossing daily
to promote healthy teeth and great breath

Imagine opening your mouth to kiss that special someone, to
have the person of your dreams smile and say,
"Wow -- what fresh breath!"

You can achieve naturally fresh breath if you floss every day.

According to dentists, the most reliable way to promote great breath, in addition to brushing twice a day, is to floss your teeth daily.

"Flossing your teeth daily removes particles of food in the mouth and stops bacteria growth", reports Dr. Strathman at the OSU College of Dentistry.

"If you are only brushing and not flossing, you're only cleaning 60 percent of the surface of your teeth."

Dr. Strathman says,
"Bacteria can still grow between your teeth and produce volatile sulphur compounds, a group of gases that cause you to lose the fresh breath that you normally would have."

In addition, flossing keeps your gums healthy.

Healthy gums help people maintain their teeth long into adulthood.

With daily flossing, plaque, a sticky film of bacteria that constantly forms on the teeth will be removed before it starts to damage the gums.

Well-flossed gums have their healthy normal pink color and rarely bleed from flossing.

Regular and correct flossing is the best way to promote fresh breath and healthy teeth.

**You'll notice the difference.
Start flossing today!**

APPENDIX D

STUDY 2 POST EXPERIMENT SURVEY

The following survey was administered one week after subjects took part in the lab section of the study.

Default Question Block

During the past eight days, that is since you took part in the lab section of this study (Friday, May 16 to Friday, May 23), on how many days did you floss your teeth?

1 2 3 4 5 6 7 8

Please take a moment and try to recall with as much detail as possible whether you flossed your teeth in the morning, evening, or after meals, on each of the following days.

Friday, May 16, (The day that you participated in this study)

Saturday, May 17,

Sunday, May 18

Monday, May 19,

Tuesday, May 20,

Wednesday, May 21,

Thursday, May 22,

Friday, May 23.

How many times did you floss on each of the following days?

	None	Once	Twice	More than Twice
Friday, May 16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saturday, May 17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sunday, May 18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monday, May 19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tuesday, May 20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wednesday, May 21	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thursday, May 22	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friday, May 23	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following are pairs of words that can be used to describe your attitude toward flossing daily. Please click on a button in between the two words that indicates the extent you lean toward one end or the other of the scale. You need to provide an answer for each pair of words.

Right now, I think flossing daily is ...

a bad idea	<input type="radio"/>	a good idea					
foolish	<input type="radio"/>	wise					
detrimental	<input type="radio"/>	beneficial					
undesirable	<input type="radio"/>	desirable					
unnecessary	<input type="radio"/>	necessary					
worthless	<input type="radio"/>	worthwhile					
difficult for me	<input type="radio"/>	easy for me					

I feel flossing daily is

not at all pleasant	<input type="radio"/>	very pleasant					
not at all enjoyable	<input type="radio"/>	very enjoyable					

My overall evaluation of flossing daily is

negative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	neutral	<input type="radio"/>	<input type="radio"/>	positive
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Please indicate the direction and extent to which your attitude on flossing daily has changed since you participated in this study.

My attitude on flossing daily is

Much More Positive	More Positive	Somewhat More Positive	The Same	Somewhat Less Positive	Less Positive	Much Less Positive
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To what extent did you imagine yourself flossing when reading the material in the study?

not at all



quite a lot

How often have you thought about flossing during the past 7 days

seldom/never



quite often

To what extent do you feel guilty when you do not floss?

not at all guilty



very guilty

To what extent do you consider flossing to be an obligation (something that you must do)?

not at all



very much

Please type your OSU email user name (e.g. smith.234) in the following text box.

Thank for your participation. The goal of this research is to understand how an individual's motivation affects how think about health related advertising information. Specifically we are interested in how individuals manage the processes by which they achieve ideals vs. attend to responsibilities. That is, how can one do things that will allow one to be in the best condition in the long run vs. how one do things that simply meet current responsibilities.

In the lab part of the study, you read one of several versions of a hypothetical pamphlet that advocated flossing your teeth every day to improve your dental health. The information supporting flossing daily either emphasizes the effectiveness of flossing to improve dental health or the self confidence aspect of building flossing as a routine in a person's everyday life.

Although we are only beginning this research, we believe that motivation matters in people's response to health related information. Persons who focus more on ideals may pay more attention to information that builds up their self confidence to maintain a health behavior, whereas those who focus more on responsibilities pay more attention to information that tells them the behavior is really effective. The data we gathered from you will help us test this hypothesis.

The data collected from you will be kept strictly confidential. We would like to ask for your continued assistance and cooperation as this research advances. Just as you approached this study without knowledge of what we are testing, and as there may be further testing involving these products in the future, we would appreciate it if you would not tell other students about the exact nature of the study.

If you have questions or any concerns about the study, or would like to find out more information about the research please do not hesitate to contact the researchers (Kaiya Liu: Liu.262@osu.edu; Dr. Curtis

Haugtvedt: Haugtvedt.1@osu.edu; and **Dr. Prabu David:** David.15@osu.edu).

Survey Powered By Qualtrics

APPENDIX E

THE NEED FOR COGNITION SCALE

Please rate how characteristic each statement is of you by entering the number from the corresponding scale that best represents your answer.

- 1 = extremely uncharacteristic
- 2 = somewhat uncharacteristic
- 3 = uncertain
- 4 = somewhat characteristic
- 5 = extremely characteristic

1. _ _ _ _ I prefer complex to simple problems.
2. _ _ _ _ I like to have the responsibility of handling a situation that requires a lot of thinking.
3. _ _ _ _ Thinking is not my idea of fun.
4. _ _ _ _ I would rather do something that requires little thought than something that is sure to challenge my abilities.
5. _ _ _ _ I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.
6. _ _ _ _ I find satisfaction in deliberating hard for long hours.
7. _ _ _ _ I only think as hard as I have to.
8. _ _ _ _ I prefer to think about small daily projects rather than long-term ones.
9. _ _ _ _ I like tasks that require little thought once I've learned them.
10. _ _ _ _ The idea of relying on thought to make my way to the top appeals to me.
11. _ _ _ _ I really enjoy a task that involves coming up with new solutions to problems.
12. _ _ _ _ Learning new ways to think doesn't excite me much.
13. _ _ _ _ I prefer my life to be filled with problems that I must solve.

14. _ _ _ _ The notion of thinking abstractly is appealing to me.
15. _ _ _ _ I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.
16. _ _ _ _ I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.
17. _ _ _ _ It's enough for me that something gets the job done; I don't care how or why it works.
18. _ _ _ _ I usually end up deliberating about issues even when they do not affect me personally.

(Source: Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment*, 48 (3), 306-307.)

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