

The effects of message quality and congruency on perceptions of tailored health communications [☆]

John A. Updegraff ^{a,*}, David K. Sherman ^b, Faith S. Luyster ^a, Traci L. Mann ^c

^a Department of Psychology, Kent State University, Kent, OH 44242-0001, USA

^b Department of Psychology, University of California, Santa Barbara, USA

^c Department of Psychology, University of California, Los Angeles, USA

Received 25 July 2003; revised 12 September 2005

Available online 17 April 2006

Abstract

Recent research has documented the effectiveness of tailoring health behavior change messages to characteristics of the recipients, but little is known about the processes underlying these effects. Drawing from the elaboration likelihood model (Petty & Cacioppo, 1986), we examined the role of message scrutiny in moderating the congruency effect (Mann, Sherman, & Updegraff, 2004). One hundred and thirty-six undergraduate participants read either a strong or weak message promoting regular dental flossing with a frame (gain vs. loss) that either matched or mismatched their motivational orientation (approach vs. avoidance). Results showed that participants were sensitive to argument quality in the matched but not mismatched conditions. Further, argument quality moderated the effect of congruency on participants' attitudes and perceived norms regarding flossing, as well as their subsequent self-reported flossing behavior. Results suggest that increased message scrutiny underlies message tailoring effects.

© 2006 Elsevier Inc. All rights reserved.

Keywords: Health attitudes; Health behavior; Health promotion; Messages; Motivation; Persuasive communication

Providing people with persuasive health messages is an important part of promoting healthy behavior. A growing body of research is showing that health messages are often more effective when they are tailored to match important characteristics of the recipient (Kreuter, Strecher, & Glassman, 1999, for review). For example, research on what we have termed the *congruency effect* (Mann et al., 2004; Sherman, Mann, & Updegraff, in press) has shown that health messages framed to match a person's predominant motivational orientation are more effective than mismatched messages. In these studies, loss-framed messages—which

communicate the costs of failing to engage in a health behavior (cf. Rothman & Salovey, 1997)—have been found to be more effective in promoting health behavior change for people predominantly motivated by avoiding negative outcomes (i.e., avoidance-oriented people; Carver, Sutton, & Scheier, 2000). On the other hand, gain-framed messages—which communicate the benefits of engaging in a particular health behavior—have been found to be more effective for people predominantly motivated to approach positive outcomes (i.e., approach-oriented people; Carver et al., 2000).

Similarly, other studies have shown the effectiveness of tailoring health messages to match other individual difference characteristics such as health locus of control (Williams-Piehot, Schneider, Pizarro, Mowad, & Salovey, 2004), need for cognition (Williams-Piehot, Pizarro, Navarro, Mowad, & Salovey, in press; Williams-Piehot, Schneider, Pizarro, Mowad, & Salovey, 2003), and monitoring style (Williams-Piehot, Pizarro, Schneider, Mowad, & Salovey, 2005). Still

[☆] We thank Kelsey Diadiun, Danielle Seidita, and Susan Zalac for research assistance on this project. We also thank Richard Petty, Michael Slater, three anonymous reviewers, and the Group for Attitudes and Persuasion at Ohio State for their helpful comments and suggestions on these findings.

* Corresponding author. Fax: +1 330 672 3786.

E-mail address: jupdegr1@kent.edu (J.A. Updegraff).

other studies have shown the effectiveness of tailoring messages to address the recipient's ethnicity (Kreuter et al., 2005), stage in the behavior change process (Prochaska, DiClemente, Velicer, & Rossi, 1993) or to a number of psychosocial and behavioral characteristics simultaneously (Kreuter, Bull, Clark, & Oswald, 1999).

Despite the growing evidence that tailoring health messages can increase effectiveness, it remains unclear why tailoring works (Miller, Buzaglo, Simms, Green, & Bales, 1999; Schneider et al., 2001; Skinner, Campbell, Rimer, Curry, & Prochaska, 1999). Most studies have examined only the effects of tailoring on behavioral outcomes, without assessing potential mediators (Brug, Glanz, Van Assema, Kok, & Van Bruekelen, 1998; Campbell et al., 1994; Prochaska et al., 1993). Moreover, many studies that have attempted to identify mechanisms have been unsuccessful (cf. Schneider et al., 2001). For example, Williams-Piehot and colleagues (Williams-Piehot et al., *in press*, 2005, 2004) have found tailoring to have no significant effect on recipients' immediate impressions of the messages, immediate affect, or their immediate intentions to engage in health behaviors, despite finding significant effects of tailoring on their subsequent behaviors.

Drawing from Petty and Cacioppo's (1986) elaboration likelihood model (ELM) of persuasion, some have speculated that tailored messages are more effective than untailored messages because they elicit greater elaboration by the recipient (cf. Kreuter, Bull et al., 1999; Petty & Cacioppo, 1986; Williams-Piehot et al., 2003). According to this account, tailored messages have greater relevance to the recipient, which increases the chances that the recipient will process the message centrally rather than peripherally. In other words, tailored messages may be more effective than untailored messages because recipients are more likely to carefully attend to and consider the merits of tailored material.

Although no study has directly examined message elaboration as a mechanism underlying tailoring effects, some studies have found evidence consistent with this explanation. For example, in a study targeting dental flossing, Sherman et al. (*in press*) found that instructional pamphlets that were framed to match the recipient's motivational orientation led to greater increases in self-efficacy relative to mismatched pamphlets. In a study targeting weight loss, Kreuter and colleagues found that tailored messages generated more positive cognitive responses from recipients than untailored responses (Holt, Clark, Kreuter, & Scharff, 2000; Kreuter, Bull et al., 1999), and that positive responses were associated with greater health behavior change (Kreuter, Bull et al., 1999).

However, inasmuch as these studies are consistent with the enhanced elaboration account, they do not provide a direct test of elaboration as a mechanism underlying tailoring effects. For example, it is possible that tailored messages are simply perceived more positively than untailored messages, irrespective of the content of the

message or the degree of scrutiny given by the recipient. For example, Kreuter, Bull et al. (1999) reported that although tailored messages elicited a greater number of positive cognitive responses than untailored messages, they did not elicit a greater overall number of responses, suggesting that participants thought about tailored materials more positively but not necessarily more deeply than untailored materials.

Examining message scrutiny as a mechanism underlying tailoring effects is important for a number of reasons. First, it adds to our understanding of the processes that enhance the effectiveness of tailored health communications. Second, by directly examining the degree of attention that recipients pay to communications, it can help explain *how* tailored messages can influence the health beliefs that have been shown to mediate behavior change, such as perceived self-efficacy (Bandura, 1998), attitudes toward the behavior and perceived norms (Ajzen & Fishbein, 1980), and intentions to perform the behavior (Ajzen, 1991).

Third, if message scrutiny is indeed a mechanism that underlies tailoring effects, then the ELM model of persuasion suggests an important boundary condition for tailoring effects. If tailoring messages increases the likelihood that a recipient will elaborate on the information, then tailored messages should only be perceived positively when they are supported by strong, persuasive arguments. If the arguments supporting a message are generally weak and unconvincing, increasing elaboration by tailoring the message should increase the likelihood of counterarguing, leading to more negative perceptions that could ultimately diminish the message's effectiveness (cf. Petty & Cacioppo, 1986; Petty & Wegener, 1998). That is, if message scrutiny is the mechanism, then it allows us to make a theory-driven prediction of a reversal in tailoring effects.

In sum, if enhanced elaboration underlies tailoring effects, argument strength should be an important moderator of tailoring effects. The present study sought to directly examine the effect of argument strength on the direction and magnitude of the congruency effect. We examined this question in the context of dental flossing in a sample of adults who, like 67–77% of adults (McCaul, 1985), reported not flossing on a daily basis. We used dental flossing as the behavior because it is one for which there is often room for improvement, and which participants can engage in frequently over a short period of time.

As in previous demonstrations of the congruency effect (Mann et al., 2004; Sherman et al., *in press*), we operationalized congruency as a match between the frame of a message (gain vs. loss) and the predominant motivational orientation of the message recipient. Approach-orientated participants who read gain-framed messages and avoidance-oriented participants who read loss-framed messages are considered "matched," whereas approach-oriented participants who read loss-framed messages and avoidance-oriented participants who read gain-framed messages are considered "mismatched."

We hypothesized that the effect of matching message frame to motivational orientation will depend on the strength of the message's arguments. In conditions where people are exposed to strong arguments in support of dental flossing, we expect to find the usual tailoring effect: matching the message to the person will be associated with more positive perceptions of the message and greater subsequent behavior change. However, in conditions where people are exposed to relatively weak arguments in support of dental flossing, we expect a reversal of the typical tailoring effect: matching the message to the person will lead to more negative opinions of the message and less subsequent behavior change.

Methods

Participants

Participants were 153 undergraduates who received extra course credit for participation. Seventeen (11%) participants who reported flossing daily in the past month were excluded from analyses, leaving a final sample of 136 participants (43 males, 93 females; age $M = 19.7$ years; Ethnicity: 116 Caucasians, 7 African-Americans, 6 Asian/Pacific Islanders, and 4 other).

Procedure

Participants completed measures individually or in groups of two. Prior to reading an article supporting daily flossing, participants completed a measure of motivational orientation and a question about their previous flossing behavior. Next, participants were randomly assigned to read one of four versions of a flossing article (described below). After reading, participants indicated their perceptions of the article, their flossing-related self-efficacy, attitudes, and perceived norms, as well as their intentions to floss over the following week. At the end of the session, participants were given seven individually wrapped flosses. One week following the session, participants were contacted via email to complete a short on-line questionnaire about their flossing behavior over the preceding week.

Measures

Motivational orientation

The BIS/BAS scale (Carver & White, 1994) is a 20-item scale that measures the relative strength of people's approach (BAS) and avoidance (BIS) motivations. The 13 BAS items ($\alpha = .81$) measure desire to approach positive occurrences. The seven BIS items ($\alpha = .76$) measure concern over the possibility of bad occurrences and sensitivity to such events when they occur. Participants rated their agreement to items on a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*). The majority of the participants ($n = 96$) completed the scale at a mass testing session held at the beginning of the semester. A minority for whom mass test-

ing data was not available ($n = 40$) completed the scale at the beginning of the first experimental session.¹

Previous flossing behavior

One item asked participants, "How often have you flossed in the past month?" Response options ranged from 1 = *never* to 7 = *multiple times each day*.

Perceptions of article

Participants indicated their perceptions of the article on several dimensions: persuasiveness, clarity, accuracy, memorability, importance, helpfulness, and usefulness, on 9-point scales. Participants also responded to two additional items, "What is your overall opinion of the article?" (1 = *very negative*; 7 = *very positive*) and "Would you recommend that the article be published in a national magazine?" (1 = *definitely recommend*; 7 = *definitely not recommend*; reverse coded). Items were averaged to form a measure of article perceptions ($\alpha = .87$).

Flossing-related self-efficacy

A 9-item scale ($\alpha = .93$) assessed participant's perceived self-efficacy about their ability to floss over the coming week on 7-point scales, and included items such as "I can floss every day" and "I can floss even if my gums bleed."

Attitudes toward flossing

A 5-item scale ($\alpha = .67$) assessed how *pleasant*, *good*, *enjoyable*, *harmful* (reverse-coded), and *worthless* (reverse-coded) participants thought flossing in the upcoming week would be.

Perceived norms about flossing

Participants responded to four items ($\alpha = .65$) assessing their perceived norms about flossing. These items, rated on a 7-point scale, included statements about others' expectations and opinions, and the participant's opinion about others' flossing behavior.

Intentions to floss

Three items asked participants the degree to which they *intended to floss*, *would try to floss*, and *planned to floss* over the following week. A fourth item asked participants to report how many times they intended to floss in the following week, with response options ranging from 0 to 8+. A total mean score of the four items was obtained ($\alpha = .88$).

Flosses used in following week

Via an online survey, participants responded to the following questions: "In the past 7 days, how many times have you flossed your teeth?" and "When you completed the study last week, we gave you a number of individually

¹ Participants who completed the BIS and BAS measures during the experimental session did not report significantly different levels compared to those who completed the measures during mass testing (p 's > .35). Further, the pattern of findings is virtually identical across the two groups.

wrapped flosses. In the past 7 days, how many of these flosses did you use to floss your teeth?"

Materials

Four articles were adapted from the American Dental Association's web page to use for the specific purpose of this experiment. The articles were educational in tone and presented facts and figures about gum disease and proper flossing technique. All articles presented identical instructions about flossing. However, arguments promoting regular flossing were presented differently in each version.

Message frame manipulation

In gain-framed messages, the potential benefits of regular flossing were emphasized, and some mention was also made to the undesirable outcomes that would be prevented. In the loss-framed messages, the potential dangers of not flossing were emphasized, and some mention was also made to the desirable outcomes that would be missed (see Mann et al., 2004, for further details).

Article strength manipulation

Strong and weak versions of the articles were created by manipulating the arguments supporting daily flossing. As recommended by Petty and Cacioppo (1986), we pretested the strength of 15 potential arguments for flossing with an undergraduate sample ($N=17$) who used a 9-point scale (1 = *extremely weak* to 9 = *extremely strong*). Three strong ($M=8.39$) and three weak ($M=2.61$) arguments were selected for inclusion in the present study materials. For example, one strong argument stated "flossing eliminates bacteria that can damage the gums" ($M=8.59$). A weak argument stated "people report that flossing helps them develop dexterity and coordination in their fingers" ($M=1.59$). In addition, strong articles included empirical evidence for flossing ("A randomized controlled study showed a 75% improvement in dental health and breath quality among people who flossed daily.") while weak articles contained more anecdotal evidence ("As a regular flosser reports, 'Now that I've started flossing my teeth regularly, my breath seems a lot better.'").

Results

Operationalization of motivational orientation

Consistent with previous work, we created a measure of motivational orientation to represent the degree to which each participant was more approach-oriented or more avoidance-oriented. We constructed this measure by taking the difference of each participant's standardized BAS and BIS scores ($zBAS-zBIS$), so that positive scores represent predominantly approach-oriented individuals, and negative scores represent predominantly avoidance-oriented individuals. Further, the greater the magnitude of a person's difference score, the greater the predominance of that person's motivational orientation.

BAS ($M=3.23$, $SD=0.38$) and BIS ($M=3.01$, $SD=0.56$) were not significantly correlated ($r=-.13$, $p=.17$).

Analytic strategy

As in our previous studies of congruency, the congruency effect is represented by a significant interaction between article frame (AF) and motivational orientation (MO). In the present study, the hypothesized interaction between congruency and argument strength (AS) is therefore represented by a three-way interaction ($AF \times MO$) \times AS.

Because one of the variables comprising our three-way interaction was continuous (MO), we tested the significance of this interaction through moderated multiple regression (cf. Aiken & West, 1991). Predictor variables included AF, MO, AS, and their second-order and third-order interaction product terms. Although we had no specific hypotheses regarding the second-order interaction effects, they were included in the model so the hypothesized third-order interaction $MF \times MO \times AS$ would be independent of all lower-order effects (cf. Aiken & West, 1991). AS (weak = -1, strong = 1) and MF (loss = -1, gain = 1) were effects-coded categorical predictors. Additionally, because there was a significant difference in past flossing behavior between participants in the strong vs. weak article conditions ($p < .05$), all regressions included past flossing behavior as a control variable.

In each of the moderated regression analyses, the congruency effect was hypothesized to be stronger in the strong article condition compared to the weak article condition. Thus, a significant and positive $AF \times MO \times AS$ coefficient supports the hypothesis. Because the direction of this interaction was specified a priori, and because of the reduced power associated with detecting significant effects in higher-order regression interaction terms (Aiken & West, 1991), we used one-tailed p values to determine the significance of the $AF \times MO \times AS$ interaction term. All other reported p values are two-tailed.

Significant $AF \times MO \times AS$ interactions were probed in two ways. First, planned comparisons examined the simple effects of AS separately in matched vs. mismatched participants to examine the role of message scrutiny as a process that underlies the congruency effect. To simplify interpretation and presentation, the AF, MO, and $AF \times MO$ variables were collapsed into a single categorical variable representing whether participants received a matched or a mismatched message. Second, through moderated multiple regression, we also estimated the magnitude and direction of the congruency effect ($AF \times MO$ interaction) separately in the strong and weak article conditions.

Analyses

Perceptions of flossing article

Table 1 shows the results of the moderated multiple regression analyses. Although there were no main effects

Table 1
Standardized regression coefficients for moderated multiple regression analyses

Predictor	Perceptions of article	Self-efficacy	Attitudes	Norms	Intentions	Flossing behavior
Past flossing	.21*	.43***	.30**	.33**	.45***	.55***
Article frame	-.07	-.07	.06	-.08	-.05	-.02
Motivational orientation	-.01	.11	.15	.09	.06	.03
Article strength	.19*	-.03	.07	-.12	-.03	-.12
AF × MO	-.01	.10	.04	.01	-.09	-.03
AF × AS	-.02	-.03	.02	.04	.01	-.07
AS × MO	-.06	.11	.07	.12	.03	.02
AF × MO × AS ^a	.15*	.09	.16*	.17*	.08	.14*

^a One-tailed *p* values used.

* *p* < .05.

** *p* < .01.

*** *p* < .001.

of either article frame or motivational orientation on participant’s perceptions of the article (*p*’s > .42), there was a significant effect of article strength. As expected and consistent with pilot data, participants perceived the strong article to be a better overall message than the weak message.

However, this main effect of article strength was qualified by a significant interaction with congruency (AF × MO). The AF × MO × AS interaction coefficient was positive and significant ($\beta = .15, p = .04$) indicating that the effect of the article strength manipulation depended on the degree of congruency. As Fig. 1 shows, there was no effect of article strength for mismatched participants: those who read the strong article (estimated $M = 7.09, SE = .15, n = 32$) had similar perceptions as those who read the weak article (estimated $M = 7.02, SE = .16, n = 39$), $p = .75$. However, matched participants were sensitive to argument strength. Participants who read the strong article had more positive perceptions of it (estimated $M = 7.41, SE = .17, n = 32$) than participants who read the weak article (estimated $M = 6.77, SE = .17, n = 29$), $p < .01$. Thus, participants who read a message that was congruent with their motivational orientation

scrutinized the arguments more than participants who read a message that was incongruent.

Further, in the strong argument condition, the congruency effect was positive but nonsignificant ($\beta = .15, p = .19$). However, in the weak argument article condition, the congruency effect was negative but also nonsignificant ($\beta = -.17, p = .21$). Thus, congruent messages were perceived most positively when supported by strong arguments, but tended to be perceived negatively when supported by weak arguments.

Flossing-related self-efficacy

None of the variables were significant predictors of participants’ perceived self-efficacy.

Flossing-related attitudes

None of the first-order or second-order predictors significantly accounted for participants’ reported attitudes towards flossing (*p*’s > .17). However, the hypothesized AF × MO × AS interaction term was positive and significant ($\beta = .16, p = .04$).

As Fig. 2 shows, for mismatched participants, there was no effect of article strength ($p = .50$), as those in the weak

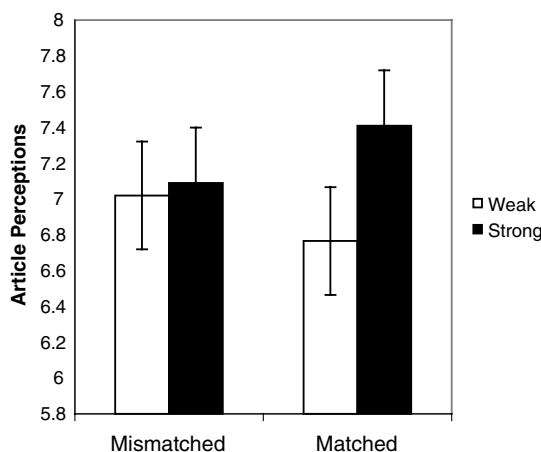


Fig. 1. Estimated means of article perceptions as a function of congruency and article strength.

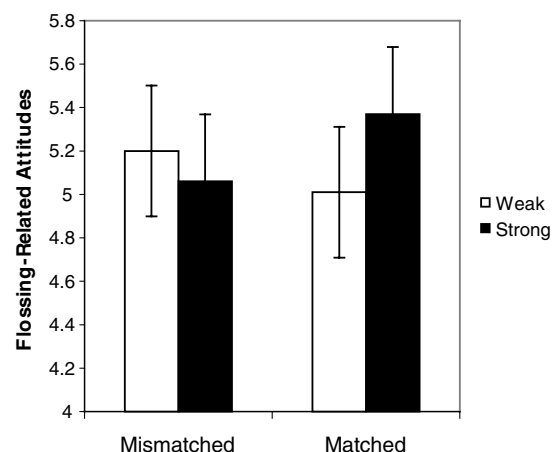


Fig. 2. Estimated means of flossing-related attitudes as a function of congruency and article strength.

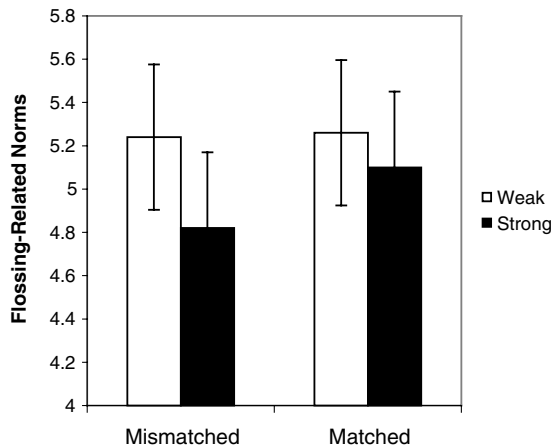


Fig. 3. Estimated means of perceived flossing-related norms as a function of congruency and article strength.

condition (estimated $M=5.20$, $SE=.14$) reported similar attitudes to those in the strong condition (estimated $M=5.06$, $SE=.16$). For matched participants, those who read the strong article had marginally more positive attitudes towards flossing (estimated $M=5.37$, $SE=.16$) than those who read the weak article (estimated $M=5.01$, $SE=.16$), $p=.09$.

Further, the congruency effect did vary according to argument strength. In the strong condition, the congruency effect was positive and marginally significant ($\beta=.20$, $p=.09$). In the weak article condition, the congruency effect was negative but nonsignificant ($\beta=-.12$, $p=.36$).

Perceived norms

All predictors of perceived norms were nonsignificant ($p's>.15$) with the exception of hypothesized $AF \times MO \times AS$ interaction, which was significant and positive ($\beta=.17$, $p=.03$). However, the pattern of the interaction differed somewhat from the pattern for article perceptions and flossing-related attitudes.

For mismatched participants, those who read the weak article (estimated $M=5.24$, $SE=.16$) reported marginally more positive norms regarding flossing than those who read the strong article (estimated $M=4.82$, $SE=.17$), $p=.072$ (see Fig. 3). For matched participants, there was no difference in perceived norms between those in the strong (estimated $M=5.10$, $SE=.18$) vs. weak (estimated $M=5.26$, $SE=.18$) condition, $p=.54$. Thus, the argument strength manipulation had the strongest effect on perceived norms in the mismatched, rather than matched condition, a finding that we will return to shortly.

However, the effect of congruency on perceived norms was consistent with the pattern described for the previous measures. In strong condition, the congruency effect was positive and trended towards significance ($\beta=.17$, $p=.14$). However, in the weak article condition, the congruency effect was negative and nonsignificant ($\beta=-.12$, $p=.41$).

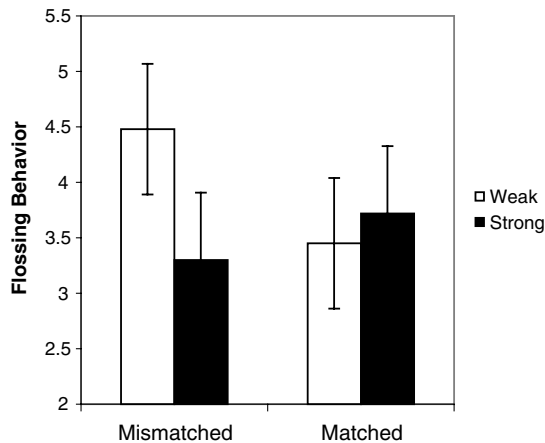


Fig. 4. Estimated means of self-reported flossing behavior as a function of congruency and article strength.

Intentions to floss

None of the variables significantly predicted participants' intentions to floss, including the $AF \times MO \times AS$ interaction (all $p's>.29$).²

Self-reported flossing behavior

None of the first-order ($p's>.14$) or second-order ($p's>.33$) interaction terms significantly predicted flossing. However, the $AF \times MO \times AS$ interaction was significant and positive ($\beta=.14$, $p=.04$), indicating that the effect of congruency on flossing behavior depended on argument strength.

As Fig. 4 shows, the pattern of the interaction resembled that of the perceived norms measure. For mismatched participants, those who read the weak article (estimated $M=4.48$, $SE=.28$, $n=36$) flossed more than those who read the strong article (estimated $M=3.30$, $SE=.30$, $n=31$), $p<.01$. For matched participants, however, there were no differences between those who read the strong (estimated $M=3.72$, $SE=.31$, $n=30$) or weak (estimated $M=3.45$, $SE=.31$, $n=29$) articles, $p=.54$.

² Although this lack of effect was unexpected, it may have been due to how the intentions items were interpreted by participants who did not already have dental floss available to use. As described, we assessed intentions immediately before giving participants flosses to keep. Thus, participants who did not previously have floss may have based their responses to the intentions items on their own perceived barriers against flossing (e.g., lack of floss) rather than on their perceived desire to floss. If this were the case, one might expect the intentions of such participants to be less sensitive to the experimental manipulations. To examine this issue, we divided participants into two groups based on whether they reported, in the follow-up questionnaire, that they used flosses other than those we provided. Although imperfect, this categorization served as a proxy for whether participants had other dental floss available to use when they completed the intentions items. Among participants who reported using flosses other than those we provided ($N=55$), their intention to floss was marginally predicted by the hypothesized interaction between congruency and argument strength ($\beta=.25$, $p=.07$). However, among participants who did not report using other floss ($n=73$) this interaction was nonsignificant ($\beta=-.03$, $p=.83$).

In the strong article condition, the congruency effect was positive but nonsignificant ($\beta = .11, p = .32$). However, in the weak article condition, the congruency effect was negative and also nonsignificant ($\beta = -.17, p = .16$).

Mediational analyses

Given the results, a pathway by which the articles may have influenced participants' attitudes is through their immediate perceptions of the article. To examine whether article perceptions mediated the effects of congruency and article strength on attitudes, we followed the guidelines proposed by Baron and Kenny (1986) for establishing mediation. First, participants' perceptions of the article significantly predicted their flossing-related attitudes ($\beta = .36, p < .001$). Second, controlling for article perceptions noticeably attenuated the strength of the AF \times MO \times AS interaction on flossing-related attitudes (from $\beta = .16, p = .04$, to $\beta = .10, p = .11$). Lastly, a Sobel test for the significance of this mediation effect was marginally significant (Sobel $z = 1.67, p = .09$). Thus, results showed that participants' attitudes towards flossing were partially mediated by their immediate perceptions of the article.

Discussion

Despite a growing body of evidence documenting the effectiveness of tailoring health communications to match important characteristics of the recipient, little is known about the mechanisms underlying this phenomenon or about its possible boundary conditions. Using the congruency effect as a model of message tailoring, the present study showed that argument strength was a significant moderator of the effect of message tailoring on recipients' perceptions of the message, their attitudes and perceived norms regarding regular flossing, as well as their subsequent self-reported behavior. Accordingly, the pattern of findings identifies increased message scrutiny as a mechanism that drives health message tailoring effects such as the congruency effect.

One of the most striking results to emerge was the finding that participants' immediate perceptions of the message were influenced by argument strength in the matched but not the mismatched condition. This pattern of results strongly suggests that tailoring health messages to individual characteristics increases the tendency for recipients to carefully evaluate the content of the message. Consistent with hypotheses, strong messages were rated better than weak messages when their frame matched the recipients' motivational orientation. However, in mismatched conditions, recipients did not discern strong messages from weak messages, indicating they were not giving the message as close consideration. As such, it is likely that recipients process tailored messages more systematically than untailored messages, suggesting that tailoring the message increases either the perceived relevance of the communication, the recipient's level of personal involvement in the process, or the participants' ability to process the information (cf. Bon-

inger, Krosnick, Berent, & Fabrigar, 1995; Petty & Cacioppo, 1986).

Further, this interactive effect of congruency and argument strength carried over to participants' reported attitudes about flossing. In the mismatched conditions, there was no effect of argument strength on participants' reported attitudes. However, in the matched condition, strong messages generated significantly more favorable attitudes towards flossing than weak messages. Thus, results suggest that when health messages contain strong, cogent arguments, increasing the recipient's scrutiny via can increase the chances that the messages will change beliefs that have been shown to guide subsequent behavior (Ajzen & Fishbein, 1980). However, when messages contain relatively weak or anecdotal evidence, tailoring may have little effect or possibly even a negative effect on recipients' attitudes.

Although there was also a significant interaction between congruency and argument strength on participants' perceived norms and flossing behavior, the pattern of the interaction differed. For both outcomes, a significant effect of message strength was noted in the mismatched rather than the matched condition. For perceived norms, this pattern may have been an unanticipated artifact of the way the strong and weak articles were constructed. Whereas the strong articles used empirical, scientific evidence to encourage people to floss, the weak articles included anecdotal reports from fictitious flossers. Thus, the strong and weak articles may also have differed in terms of communicating norms regarding flossing, and participants in the matched condition may have been especially sensitive to this information.

However, it remains unclear why argument strength had an effect on flossing behavior in the mismatched rather than the matched condition. One possible explanation is that the flossing behaviors of this college-aged sample may have been strongly influenced by perceived norms, especially for a behavior that has clear implications for physical attractiveness.³ Moreover, it is also possible that the argument quality manipulation may have influenced persuasion via different routes depending on degree of elaboration (Petty & Cacioppo, 1986). In mismatched conditions, where elaboration was low, participants may have processed the simple anecdotal reports in the weak article more easily than some of the more technical, scientific information in the strong article. Indeed, research in the context of alcohol education (Slater & Rouner, 1996) has shown anecdotal evidence to be more persuasive in low elaboration conditions, whereas statistical evidence to be more persuasive in high elaboration conditions. Thus, participants in the weak/mismatched condition may not have discredited the anecdotal arguments, causing them to remain credible and accessible over the following week. Thus, it is probable that our

³ Indeed, of all the possible mediators assessed here (excluding intentions), perceived norms was the strongest predictor of flossing behavior.

manipulations exerted effects on behavior through processes other than those directly investigated here, and future research should investigate other pathways by which message tailoring influences persuasion.

The results of this study also suggest an important boundary condition for the tailoring effect. In fact, the findings suggest that increasing message scrutiny by tailoring messages may not be without its costs. The direction of the congruency effect depended on the nature of the supporting arguments. When arguments were strong, matching the message to recipients' motivations had favorable effects on participants' perceptions of the article, attitudes toward flossing, and subsequent behavior. However, when supporting arguments were weak, matching the message to motivations led to noticeably worse effects on these outcomes. Although health communication campaigns clearly strive to include strong and convincing messages, the nature of the supporting evidence can vary considerably, ranging from anecdotal, emotional appeals to more detailed, empirical reports. Our results suggest that the effectiveness of tailored health communications may depend on the nature of the supporting evidence, and that future research should seek to more fully examine the effects of tailoring different types of evidence on recipients' health-related beliefs and behaviors.

In sum, the present findings suggest that tailoring health messages to increase effectiveness is driven, in part, by the increased cognitive elaboration afforded to messages that match important concerns or characteristics of the recipient. In some cases, when messages are strong and when recipients are not motivated to counterargue, tailored messages can indeed be more effective than generic or untailored messages (cf. Kreuter, Bull et al., 1999; Mann et al., 2004; Miller et al., 1999; Williams-Piehota et al., 2004). However, in other cases, when messages are relatively weak or when recipients perceive a health message to be particularly threatening (Kiene, Barta, Zelenski, & Cothran, 2005; Tykocinski, Higgins, & Chaiken, 1994), tailored messages may actually be counterproductive. Thus, message tailoring may not be a guaranteed method of enhancing the effectiveness of health communications. Understanding the factors and processes that account for these varied effects is an essential avenue for future research to address.

References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage Publications.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13, 623–649.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- Boninger, D. S., Krosnick, J. A., Berent, M. K., & Fabrigar, L. R. (1995). The causes and consequences of attitude importance. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences* (pp. 159–189). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Brug, J., Glanz, K., Van Assema, P., Kok, G., & Van Bruekelen, G. J. P. (1998). The impact of computer-tailored feedback and interactive feedback on fat, fruit, and vegetable consumption. *Health Education and Behavior*, 25, 517–531.
- Campbell, M. K., DeVellis, B. M., Strecher, V. J., Ammerman, A. S., DeVellis, R. F., & Sandler, R. S. (1994). Improving dietary behavior: The effectiveness of tailored messages in primary care. *American Journal of Public Health*, 84, 783–787.
- Carver, C. S., Sutton, S. K., & Scheier, M. F. (2000). Action, emotion, and personality: Emerging conceptual integration. *Personality and Social Psychology Bulletin*, 26, 741–751.
- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, 67, 319–333.
- Holt, C. L., Clark, E. M., Kreuter, M. W., & Scharff, D. P. (2000). Does locus of control moderate the effects of tailored health education materials? *Health Education Research*, 15, 393–403.
- Kiene, S. M., Barta, W. D., Zelenski, J. M., & Cothran, D. L. (2005). Why are you bringing up condoms now? The effect of message content on framing effects of condom use messages. *Health Psychology*, 24, 321–326.
- Kreuter, M. W., Bull, F. C., Clark, E. M., & Oswald, D. L. (1999). Understanding how people process health information: A comparison of tailored and nontailored weight-loss materials. *Health Psychology*, 18, 487–494.
- Kreuter, M. W., Strecher, V. J., & Glassman, B. (1999). One size does not fit all: The case for tailoring print materials. *Annals of Behavioral Medicine*, 21, 276–283.
- Kreuter, M. W., Sugg-Skinner, C., Holt, C. L., Clark, E. M., Haire-Joshu, D., Fu, Q., et al. (2005). Cultural tailoring for mammography and fruit and vegetable intake among low-income African-American women in urban public health centers. *Preventive Medicine: An International Journal Devoted to Practice and Theory*, 41, 53–62.
- Mann, T. L., Sherman, D. K., & Updegraff, J. A. (2004). Dispositional motivations and message framing: A test of the congruency hypothesis in college students. *Health Psychology*, 23, 330–334.
- McCaul, G. G. (1985). Predicting levels of preventive dental behaviors. *Journal of the American Dental Association*, 111, 602–605.
- Miller, S. M., Buzaglo, J. S., Simms, S. L., Green, V., & Bales, C. (1999). Monitoring styles in women at risk for cervical cancer: Implications for the framing of health-relevant messages. *Annals of Behavioral Medicine*, 21, 27–34.
- Petty, R. E., & Cacioppo, J. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York: Springer-Verlag.
- Petty, R. E., & Wegener, D. T. (1998). Matching versus mismatching attitude functions: Implications for scrutiny of persuasive messages. *Personality and Social Psychology Bulletin*, 24, 227–240.
- Prochaska, J. O., DiClemente, C. C., Velicer, W. F., & Rossi, J. S. (1993). Standardized, individualized, interactive, and personalized self-help programs for smoking cessation. *Health Psychology*, 12, 399–405.
- Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, 121, 3–19.
- Schneider, T. R., Salovey, P., Apanovitch, A. M., Pizarro, J., McCarthy, D., Zullo, J., et al. (2001). The effects of message framing and ethnic targeting on mammography use among low-income women. *Health Psychology*, 20, 256–266.
- Sherman, D.K., Mann, T.L., Updegraff, J.A. (in press). Approach/avoidance orientation, message framing, and health behavior: Understanding the congruency effect. *Motivation and Emotion*.
- Skinner, C. S., Campbell, M. K., Rimer, B. K., Curry, S., & Prochaska, J. O. (1999). How effective is tailored print communication? *Annals of Behavioral Medicine*, 21, 290–298.

- Slater, M. D., & Rouner, D. (1996). Value-affirmative and value-protective processing of alcohol education messages that include statistical evidence or anecdotes. *Communication Research, 23*, 210–235.
- Tykocinski, O., Higgins, E. T., & Chaiken, S. (1994). Message framing, self-discrepancies, and yielding to persuasive messages: The motivational significance of psychological situations. *Personality and Social Psychology Bulletin, 20*, 107–115.
- Williams-Piehot, P., Pizarro, J., Navarro, S., Mowad, L., Salovey, P. (in press). Need for cognition and message complexity in motivating fruit and vegetable intake among callers to the Cancer Information Service. *Health Communication*.
- Williams-Piehot, P., Pizarro, J., Schneider, T. R., Mowad, L., & Salovey, P. (2005). Matching health messages to monitor-blunter coping styles to motivate screening mammography. *Health Psychology, 24*, 58–67.
- Williams-Piehot, P., Schneider, T. R., Pizarro, J., Mowad, L., & Salovey, P. (2004). Matching health messages to health locus of control beliefs for promoting mammography utilization. *Psychology and Health, 19*, 407–423.
- Williams-Piehot, P., Schneider, T. R., Pizarro, J., Mowad, L., & Salovey, P. (2003). Matching health messages to information-processing styles I: Need for cognition and mammography utilization. *Health Communication, 15*, 375–392.