

Understanding Tailored Internet Smoking Cessation Messages: A Reasoned Action Approach

By
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Although message tailoring has been shown to produce experimental effects in previous studies, the cognitive mechanisms through which tailoring works have not been sufficiently studied. Using the integrative model to predict intentions to use the nicotine replacement patch among adult smokers, this study examines how tailoring theoretical elements of the integrative model is effective in changing the theoretical mediators. Participants were randomized into one of two conditions. In the experimental condition, participants received messages tailored to some or all of the underlying behavioral, injunctive normative, or self-efficacy beliefs with the expectation that changing the underlying beliefs would result in experimental differences in the integrative model's direct measures. This expectation was confirmed. The integrative model also worked well in predicting intentions to perform the target behavior; attitude, perceived normative pressure, and perceived behavioral control accounted for 53 percent of the variance in intentions. Attitude and normative pressure were the strongest predictors of intention. These results provide support for tailoring messages using a reasoned action approach and provide insight into the mechanism through which message tailoring operates.

Keywords: reasoned action theory; tailoring; smoking cessation; nicotine replacement; integrative model

Cigarette smoking results in an estimated 443,000 premature deaths and \$193 billion in direct health care expenditures and productivity loss annually (Centers for Disease Control and Prevention [CDC] 2008). In addition to increasing the risk of chronic obstructive pulmonary disorders and cardiovascular diseases,

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cigarette smoking is also a risk factor for cancers of the lung, oral cavity, larynx, stomach, esophagus, colon, rectum, bladder, and kidney (Doll et al. 1994). Smoking is the cause of 30 percent of all cancer deaths (Kreps 2003) and about 90 percent of all lung cancer deaths (CDC 2008). Even with these well-documented risks, smoking continues to be the leading preventable cause of premature death and disease in the United States (CDC 2008).

Although much effort has been expended to control cigarette smoking, many adult Americans still smoke. An estimated 43.4 million (or one in five) adults in the United States in 2007 were current smokers (CDC 2008). Helping people quit smoking is the most effective way to prevent smoking-related morbidity and mortality (CDC 2008). A range of smoking cessation techniques, including nicotine replacement therapy (NRT), are widely available (CDC 2008), and NRT has proven to be an effective therapeutic smoking cessation tool (Cepeda-Benito, Reynoso, and Erath 2004; Hughes et al. 2003; Silagy et al. 2004). NRTs available for use by smokers include the patch, gum, nasal spray, and inhaler (Cokkinides et al. 2005), and their use doubles the odds of smoking cessation (Raw, McNeill, and West 1999). Although there are advantages to using NRTs, many quit attempts are made without their aid (Cokkinides et al. 2005). With the current smoking rates in the United States being as high as they are, compelling arguments exist for developing an effective theory-based NRT smoking cessation program aimed at different segments of the population that can be delivered in a cost-effective manner.

What is message tailoring?

The public health impact of an intervention is measured by multiplying its efficacy and reach in the target population (Glasgow, Vogt, and Boles 1999). Using the Internet to disseminate effective NRT smoking cessation information would have a large public health impact (Etter 2009). There are various approaches to improving the public health impact of interventions that may operate at the individual, interpersonal, group, and community levels (Smedley and Syme 2000). One promising area of health communication research is message tailoring. Tailoring is defined as “any combination of information and behavior change strategies intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and derived from an individual assessment” (Kreuter et al. 2000, 5). Thus, tailored health messages are created for an individual based on individual-level information. Although tailored information can be gathered through a variety of sources (e.g., interviews, questionnaires, medical records), using computers permits individual information to be matched with specific health promotion messages to create tailored materials that reflect the individual’s underlying belief system and demographics.

There is a theoretical rationale that suggests that tailored messages would be more effective in promoting behavior change than would universally targeted messages. According to Petty and Cacioppo’s elaboration likelihood model

(ELM), people are more likely to actively and thoughtfully process information if they perceive it to be personally relevant (Cacioppo, Harkins, and Petty 1981). Thus, when messages are tailored, superfluous information is by definition eliminated, and the information or motivation provided is personally relevant to the message's target individual or group. In fact, tailored messages have been shown to be read more, be seen as more personally relevant, attract the reader's attention more, and be remembered more than generic messages (Hawkins et al. 2008; Strecher et al. 1994; Brinberg and Axelson 1990).

Tailoring and psychosocial theoretical constructs

The theory of reasoned action (TRA), the theory of planned behavior (TPB), and the integrative model of behavior change (IM) are the most widely applied models for predicting and understanding specific behaviors in social psychology (Ajzen 1991). In a meta-analysis of tailored print interventions, tailoring on attitudes and self-efficacy produced larger effect sizes than not tailoring on these theoretical concepts (Noar, Benac, and Harris 2007). However, reasoned action theory is rarely used when tailoring health communication messages (Noar, Benac, and Harris 2007). Tailoring researchers have traditionally used the health belief model (HBM) (Becker 1974), social cognitive theory (SCT) (Bandura 1986), transtheoretical model, and stages of change (Prochaska and DiClemente 1983; Prochaska, DiClemente, and Norcross 1992) to develop tailored message (Noar, Benac, and Harris 2007).

The IM (Fishbein 2000; Fishbein et al. 2001) combines key constructs from the TRA (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975), the TPB (Ajzen and Madden 1986), the SCT (Bandura 1986), and the HBM (Becker 1974). For a review of the rationale and structure of the elements of the IM, see Ajzen, in this volume. The theoretical constructs of the IM have successfully predicted a variety of health behaviors (Ajzen 1991; Albarracín et al. 2001). For example, Smith-McLallen and Fishbein (2008) applied the IM to predict intentions to engage in three cancer-screening behaviors (mammogram, colonoscopy, and PSA test) and three lifestyle behaviors (exercising, eating fruits and vegetables, and controlling one's diet to lose weight). The IM components, specifically attitudes, perceived control, and normative pressure, account for 47 to 54 percent of the variance in intention scores of the six cancer-screening and lifestyle-related behaviors (Smith-McLallen and Fishbein 2008). In general, intention accounts for 20 to 30 percent of the variance in behavior (Armitage and Conner 2001; Godin and Kok 1996; Sutton 1998).

Reasoned action theory and smoking cessation

Social cognitive approaches assume that smoking behavior can be influenced by one or more of the underlying cognitive determinants of behavior (Wiggers et al. 2005). The cognitive theoretical constructs of the IM (attitudes, perceived normative pressure [norms], and self-efficacy) have been shown to be

important in the prediction and explanation of smoking intentions and smoking behavior (Godin and Kok 1996; Godin et al. 1992). Godin and others (1992), for example, verified the basic assumptions underlying a reasoned action approach for the prediction of smoking initiation, intention, and smoking behavior among adults. They found that attitudes, social normative pressure, and self-efficacy predicted intention, whereas self-efficacy alone predicted behavior. A consistent pattern of findings has emerged when applying a reasoned action approach to smoking: the theoretical constructs (attitude, norms, and self-efficacy) predict intentions to continue smoking (Godin 1993), stage of smoking acquisition (Hill et al. 1997), and intentions to quit smoking (Babrow, Black, and Tiffany 1990).

Experimentally combining reasoned action theory and message tailoring

In the IM, the direct measures of attitude toward performing a behavior, perception of normative pressure, and self-efficacy/control considerations about performing the behavior are each determined on a set of underlying beliefs and are the principal determinants of intention to perform a given behavior (Fishbein 2000; Fishbein et al. 2001). With message tailoring, the individual underlying beliefs are assessed for each respondent, and tailored messages are developed for each underlying belief based on these assessments. This is the essence of message tailoring: matching a behavioral change message to an individual's salient beliefs.

This study shows that using theoretical tailoring to create a website that promotes the use of the nicotine replacement patch can affect the direct measures that underlie a behavior and thus increase intentions to perform the behavior. That is, experimental participants receiving messages tailored on behavioral beliefs will report more favorable attitudinal responses, participants receiving messages tailored on injunctive and descriptive normative beliefs will report favorable perceptions of social normative pressures, and participants receiving messages tailored on efficacy beliefs will report stronger self-efficacy than participants who receive a less tailored or completely untailored health communication.

Methods and Measures

Study design and participants

A sample of adult smokers was obtained from Zoomerang ZoomPanel's consumer survey panel of more than 2.5 million people in the United States. Five hundred and fifty members of the Zoompanel who self-identified as being a current smoker received an e-mail invitation to participate in the study. Besides self-identifying as being a current smoker, participants had to be ages 18 to 75. In total, 495 participants completed the experiment (response rate = 90 percent). These participants were given a Web address and an identification code that was

used to enter into the experimental website. After logging into the website, respondents read and electronically signed the consent form and completed the assessment instrument. After completing the assessment instrument, each participant viewed nicotine replacement patch materials presented on a website that varied in message content based on degree of tailoring. The computer program assigned participants to one of seven conditions that randomly tailored the website on zero to six tailoring variables: gender, age, ethnicity, attitude, norm, and self-efficacy.

For the purpose of this article, only the tailoring on the theoretical variables of attitude toward the behavior, normative pressure, and self-efficacy are investigated. Both the structure and overall content of the messages were identical for all groups: participants received information concerning general benefits of and barriers to quitting smoking, setting a quit date, and the National Cancer Institute's and American Cancer Society's smoking cessation materials on nicotine replacement therapy. After participants viewed the website, they immediately completed a posttest questionnaire.

Tailoring the webpage

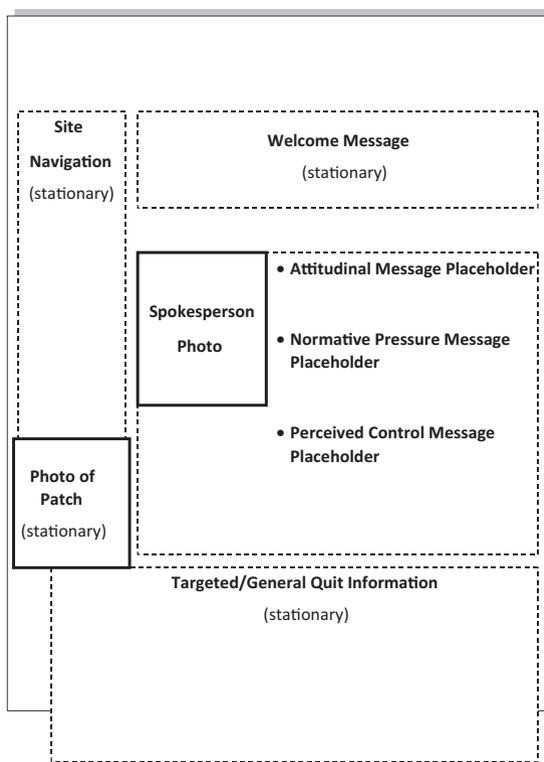
The tailoring intervention began with each participant completing an assessment questionnaire. The assessment questionnaire took about 10 to 15 minutes to complete and consisted of forty-two items. It assessed demographics and smoking behavior and identified the participants' most important behavioral outcome (e.g., the behavioral beliefs about performing the target behavior), social referent (e.g., the injunctive normative beliefs), and barriers or facilitators with respect to using the nicotine replacement patch (e.g., control beliefs). In each of the theoretical content domains (i.e., attitudes, norms, self-efficacy), participants were asked to identify the determinant, referent, or barrier they felt was the *most important influence* on their decision to use the nicotine replacement patch to quit smoking in the next six months.

The experimental website then linked the participants' responses to the assessment questionnaire, messages, and experimental condition. By using tailoring algorithms, the computer program connected the assessment responses for specific questions to the corresponding tailoring text and placed the tailoring text in the appropriate message block on each webpage.

Webpage design

The tailored webpage was similar to any webpage or online newsletter or newspaper. There were fixed locations for the placement of text and graphics, and the layout stayed the same while the text and graphics varied. Like any webpage, the experimental page was based on a template, shown in Figure 1. This template provided the visual organizational framework for the webpage, in that it included where each tailored message block/graphic appeared on the page and where the stationary information appeared. Using a very simple page grid and

FIGURE 1
Webpage Template



iconographic elements, visual cues directed the reader to the experimental content. The experimental content was also presented near the top of the first webpage so that one would not have to scroll down. Participants were guided through the website with buttons that became active after a minimal predetermined amount of time. Participants had to view each page for three minutes before they could continue to the next page.

After participants viewed the website, they were asked to fill out a posttest questionnaire. The posttest questionnaire measured the central constructs of the IM (Fishbein 2008)—behavioral intentions, attitudes, perceived normative pressure, and self-efficacy—in relation to using the nicotine replacement patch to quit smoking in the next six months. The posttest questionnaire took 15 to 20 minutes to complete and consisted of seventy-one items.

Embedded nicotine replacement theoretical messages

The tailored nicotine replacement materials generated in this study were based entirely on participants’ answers to questions in the assessment questionnaire (i.e., underlying behavioral beliefs, social referents, and barriers or

TABLE 1
List of Underlying Beliefs that Generated the Tailored Message Components

Behavioral beliefs
It's an effective way to quit smoking.
It will help me quit smoking.
It will help fight cravings.
Allows me to wean myself off nicotine
Steady supply of nicotine
I might overdose on nicotine.
I might not get enough nicotine from the patch.
It's simple and easy to use.
It's discreet.
It costs too much.
I might smoke while on the patch.
I will start smoking when I stop using the patch.
I will have a skin reaction.
Injunctive normative referents
Your family
Your friends
Your parents
Your spouse
Your doctor or health professional
Barriers and facilitators
Free or lower cost
If people close to me also quit
If people close to me continued to smoke
Being around smokers
Easy to obtain/easily available
If I had a preexisting health condition that didn't allow me to use the patch
If it were more discreet

facilitators) plus their age, gender, and ethnicity. As described in detail below, if the participants were in the "tailored on attitude" condition, they would receive a tailored behavioral belief message. If the participants were in the "nontailored on attitude" condition, they would receive a randomly selected behavior belief message that was not their tailored message. With the exception of three facilitators/barriers (easy to obtain, discreet, preexisting condition), each belief had two possible messages, resulting in forty-nine total messages in the message library.¹ Table 1 shows the list of underlying beliefs used for this study.

With respect to being tailored on attitude, participants were given a list of thirteen behavioral beliefs, each linking using the nicotine replacement patch in the next six months to a positive or negative outcome, and participants were asked to identify the one belief that was most important to them in deciding whether or not to use the nicotine replacement patch. After identifying this belief

statement, they were asked if they believed this statement. Once the respondent identified his or her most important belief, the webpage generator program selected a text element that reflected this belief and inserted the text into the webpage at the appropriate location. For example, if the respondent selected behavioral belief number eight (see Table 1), the inserted text in the attitudinally tailored experimental status could have been

Using the nicotine replacement patch has never been easier:

Step 1: Clean a nonhairy area of the skin.

Step 2: Open the sealed foil pouch and remove the sticky side's plastic liner.

Step 3: Press the nicotine replacement patch firmly on your skin.

For injunctive norms, participants were asked to identify the person who was most important in influencing their decision to use the nicotine replacement patch to quit smoking in the next six months and if that person would approve or disapprove of their using the nicotine replacement patch. For example, if the respondent selected referent number four (see Table 1), the inserted text in the normatively tailored experimental status could have been

Using the nicotine replacement patch to quit smoking will make your spouse proud of you. In addition, secondhand smoke can cause cancer in the people around you. It can also cause breathing problems and heart disease.

For self-efficacy, respondents were given a list of potential situations and were asked to identify the situation that would be most likely to facilitate or hinder them in using the nicotine replacement patch to quit smoking in the next six months; they were then asked to identify if being in that situation would make it easy or hard to use the nicotine replacement patch to quit smoking in the next six months. For example, if the respondent selected barrier number five (see Table 1), the inserted text in the self-efficacy tailored experimental status could have been

You can buy the nicotine replacement patch at your local food, drug and discount stores. Or buy the nicotine replacement patch now ONLINE! You can purchase the nicotine replacement patch at any of the online stores below . . .

Main study measures

One item, on a seven-point *strongly disagree* to *strongly agree* scale, assessed *intentions* to use the nicotine replacement patch to quit smoking in the next six months; scores could thus range from -3 to $+3$ ($M = 0.28$, $SD = 2.30$). *Attitudes* toward "using the nicotine replacement patch to quit smoking in the next six months" were measured with six semantic differential scales. The anchors of these scales were bad/good, difficult/easy, unsafe/safe, foolish/wise, unpleasant/pleasant, and unenjoyable/enjoyable. High scores were assigned to the positive end of each scale, and scores could range between -3 and $+3$. These items were averaged to create an attitude scale that yielded an acceptable alpha ($\alpha = .88$, $M = 0.64$, $SD = 1.76$). *Perceived normative pressure* was assessed with three items

(most people important to me, most people whose opinions I value, and how many are smokers like you) each scored on a seven-alternative scale with endpoints: I should not/I should, not support/support, and many/few, respectively. Thus, perceived normative pressure was assessed by averaging participants' responses to the three items, each scored -3 to $+3$, and high scores were assigned to the positive end of each scale (Cronbach's alpha for the three perceived normative pressure items was .84; $M = 0.68$, $SD = 2.04$). *Perceived behavioral control* was assessed by three items (how much control, how certain, and completely up to me) on a seven-point scale. Thus, perceived behavioral control was assessed by averaging participants' responses to the three items, each scored -3 to $+3$. High scores were assigned to the positive end of each scale. Cronbach's alpha for the three perceived behavioral control items was .94 ($M = 0.20$, $SD = 2.18$).

Statistical analyses

Descriptive statistics and frequency distributions were calculated for all demographic variables in the assessment questionnaire. A path analysis was conducted using Mplus (Muthén and Muthén 2006) to estimate the experimental effects of tailoring on the direct measures and, thus, their indirect effect mediated via the IM predictors of intentions.

Results

Efficacy of randomization

Three items on the assessment questionnaire were used to check the computer randomization to the experimental condition. Three ANOVA tests were conducted, with tailoring condition as the independent variable and gender, age, and participant's desire to quit smoking cigarettes as dependent variables. The results indicated that there were no significant differences across the two experimental conditions examined in this study before they were exposed to the web-pages that constituted the treatment stimulus.

Correlations among the integrative model constructs

Table 2 presents the results of the zero-order correlational analyses among the psychosocial variables composing the IM. All three of the direct determinants are significantly correlated with intention.

Tailoring underlying beliefs

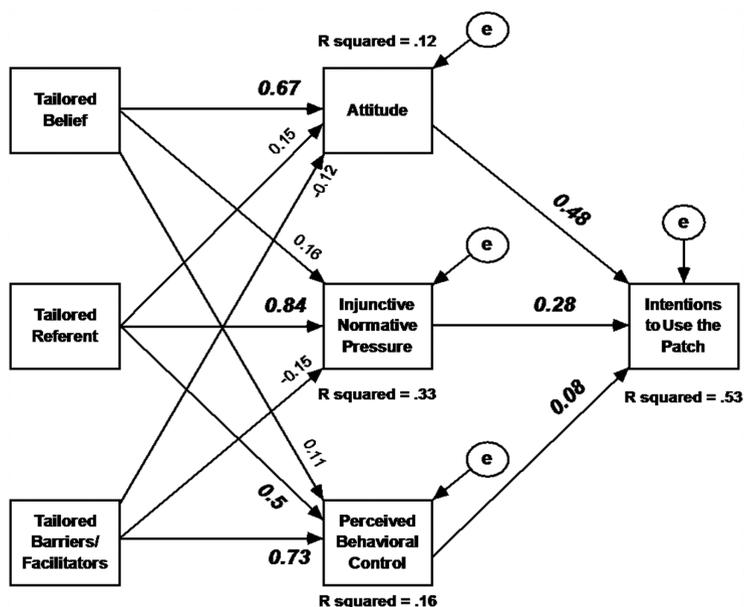
One would expect that messages tailored on attitude would produce more favorable attitudinal responses, messages tailored on perceived normative pressure would produce favorable perceptions of social normative pressures, and messages tailored on perceived behavioral control would produce stronger feelings of

TABLE 2
Correlations of IM Direct Measure Mediators and Intentions

Attitude				
.589	Perceived normative pressure			
.408	.528	Perceived behavioral control		
.680	.605	.421	Intention	

NOTE: All correlations are statistically significant. $N = 495$.

FIGURE 2
The Effects of Tailoring for the Underlying Beliefs on Corresponding Direct Measure



NOTE: Correlations between exogenous variables and error terms of the three theoretical mediators are not shown for clarity. Parameters of treatment status on the theoretical mediators are partially standardized; all others are fully standardized. Bold, italic coefficients are statistically significant.

control regarding the use of NRT. To test this assumption, a path analysis was conducted to estimate the experimental status effects on the direct measures. These results are shown in Figure 2.

Figure 2 shows that tailoring to the underlying beliefs produced more favorable responses to the corresponding direct measure than nontailoring. Messages tailored on behavioral beliefs produced more favorable attitudes than perceived

normative pressures or feelings of control. Messages tailored on the control beliefs produced a stronger feeling of control than attitude or normative pressure, and messages tailored on normative beliefs produced a more favorable perceived normative pressure than attitude, but these messages also produced more favorable feelings of control. As predicted by the IM, attitude ($\beta = .48$), perceived normative pressure ($\beta = .28$), and perceived behavioral control ($\beta = .08$) were all significantly associated with intentions. The model accounted for 53 percent of the variance in intentions to use the nicotine replacement patch in the next six months. The results show that the model fit the data well as the global goodness-of-fit indices were excellent: chi-squared = 2.93, $df = 3$, $p = .40$, root mean square errors (RMSE) = 0, and Tucker-Lewis index = 1.0.

Discussion

The tailored nicotine replacement patch online intervention was more effective than its nontailored counterpart. The study showed that the tailored intervention webpage had positive effects on the attitude, injunctive norm, and control antecedents to using the nicotine replacement patch to quit smoking. In addition, the results were consistent with the earlier reasoned action approach to smoking cessation studies in which intention to quit smoking was examined (Droomers, Schrijvers, and Mackenbach 2004; Moan, Rise, and Andersen 2005; Rise et al. 2008). Our results demonstrated that the IM could explain more than 50 percent of the variance in behavioral intentions to use the nicotine replacement patch with attitude, perceived normative pressure, and perceived behavioral control theoretical mediators.

However, there was one anomalous finding. Tailoring on normative beliefs also induced stronger self-efficacy beliefs (see Figure 2). The tailored normative message attempted to influence, in a positive direction, the beliefs that one's important others will be supportive and that using the nicotine replacement patch will help the health status (e.g., decrease secondhand smoke exposure, decrease ear infections among babies) of people they are close to. One possible explanation for this anomalous finding is that because normative referents are one's parents, family, friends, spouse, and health care providers and these people are people one feels "close to" and are possibly the smokers they are "around," a normatively tailored message is also indirectly tailored to several of the self-efficacy/control barriers and facilitators that are correlated with a respondent's normative referents (e.g., "people close to me" and "being around smokers").

In terms of the IM's ability to predict smoking-related behaviors, similar results have been observed in studies on quitting smoking in which the reasoned action theoretical determinants accounted for 49 percent of the variance in quitting intentions among adults (Norman, Conner, and Bell 1999). Moan, Rise, and Andersen (2005) reported that attitude, subjective norms, and perceived behavioral control accounted for 36 percent of the variance in intentions to quit

smoking. Similarly, Droomers, Schrijvers, and Mackenbach (2004) reported that persons with a more positive attitude toward smoking cessation and a high subjective norm significantly more often intended to quit smoking. Rise and colleagues (2008) indicated that the reasoned action components accounted for 30 percent of the variance in quitting intentions, with affective attitude and descriptive norm emerging as the strongest predictors of quitting intention. In light of a recent systematic review of the smoking cessation literature, showing convincing evidence for the effectiveness of NRT (Lemmens et al. 2008), this study also adds new evidence about the ability of the IM to predict adults' intentions to use the nicotine replacement patch to quit smoking in the next six months.

Hawkins and colleagues (2008) discussed unaddressed issues in the tailoring research. Specifically, they recommended that tailoring research focus on how tailoring works and the relative impact of various tailoring strategies (Hawkins et al. 2008). Tailoring theoretical content is the essence of tailoring because it targets messages designed to address the participant's status on the key theoretical determinants of behavior to the individual (Hawkins et al. 2008), increasing the likelihood that behavior change will occur. This study manipulated tailoring of the theoretical variables to better understand the mechanism of tailoring and how it achieves persuasive effects. The results of the current study indicate that nicotine replacement messages that were tailored to an individual's underlying belief system were better received than those that were not.

These results are of both theoretical and practical interest. They confirm that the IM provides a useful framework for understanding antecedents of adult usage of the nicotine replacement patch, and it provides insight into the mechanics of tailoring. Because the tailored messages delivered were brief, communication technologies such as the mobile phone's short message service (SMS) text messaging may provide more opportunities for delivering tailored information that is easily accessed and independent of place, time, and Internet connection.

Note

1. These messages had been pretested on an independent sample of adult smokers to ensure that each message pair was equivalent and that each message was rated as a strong argument.

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