

Tailored Interventions for Motivating Smoking Cessation: Using Placebo Tailoring to Examine the Influence of Expectancies and Personalization

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The present study examined mechanisms underlying the effectiveness of tailored interventions for motivating smoking cessation. The study used a placebo-tailoring design to test whether the efficacy of tailoring was due, in part, to personalized features in addition to the theoretically based content. Two hundred forty adult smokers were randomized to 1 of 3 conditions: standard booklet, minimally personalized booklet, or extensively personalized booklet. The interventions varied in their degree of ostensible tailoring, yet the actual smoking-related content of the booklets was identical. A dose-response relationship was hypothesized, with the greatest apparent tailoring producing the most positive outcomes. This pattern was found for evaluation of the booklets, with trends for readiness to change and self-efficacy increases. Moreover, as hypothesized, the effect of the interventions on readiness was moderated by participants' expectancies about tailoring.

Keywords: tailoring, self-help, smoking, personalization, tobacco

Self-help, or minimal, interventions have considerable appeal as a tool for altering health-related behaviors. Compared with face-to-face interventions, written materials offer the potential advantages of low cost and easy, widespread dissemination. Thus, written materials increasingly have been developed and used to promote behavior change, including smoking cessation. There are three primary classifications of written health education interventions: standard, targeted, and tailored (Strecher, 1999). *Standard* (or *generic* or *general*) health education interventions provide information geared to the general population of interest, such as cigarette smokers, and they represent the most common public health approach (e.g., American Cancer Society, 1997). *Targeted* interventions are written with a particular subgroup in mind, such as older smokers (Rimer et al., 1994), smokers who have already quit (Brandon et al., 2000), or African American smokers (Lipkus, Lyna, & Rimer, 1999). Finally, *tailored* interventions are specifically written (usually with a computer algorithm) on the basis of the characteristics of each individual recipient, through the use of previously assessed individual-differences variables. There are several recent examples of such tailored interventions designed for smokers (e.g., Aveyard, Griffin, Lawrence, & Cheng, 2003; Prochaska, Velicer, Fava, Rossi, & Tsoh, 2001; Shiffman et al., 2000). Ideally, tailored written interventions attempt to approximate the natural customization of treatment that takes place during

face-to-face counseling or therapy, but at a fraction of the cost and with much greater portability.

Mechanisms of Tailoring

The content of tailored interventions has generally been framed according to one or more psychosocial models of behavior change, a process referred to as *behavioral construct tailoring* (Kreuter, Oswald, Bull, & Clark, 2000). Each model conceptualizes the determinants of behavior along with corresponding methods to influence mediating variables, such as self-efficacy, outcome expectancies, and readiness to change. Tailoring matches the intervention content to each individual's cognitive profile, as indicated by the governing theory.

The transtheoretical model (TTM; Prochaska & DiClemente, 1983; Prochaska & Velicer, 1997) has become the prominent paradigm for tailoring smoking cessation interventions. Commonly referred to as the stages-of-change model, the TTM asserts that individuals progress through a five-stage process, gradually increasing their motivation to quit smoking and maintain abstinence. In this context, the function of tailoring is to influence the cognitive processes occurring at each stage and to mediate stage transitions. For example, self-efficacy and outcome expectations are often associated with specific stages and have been included in the content of tailored intervention studies (De Vries, Mudde, Dijkstra, & Willemsen, 1998; Dijkstra, De Vries, & Bakker, 1996; Dijkstra, De Vries, & Roijackers, 1998a, 1998b). Recent reviews of stage-based smoking cessation interventions have reached opposite conclusions about their efficacy (Riemsma et al., 2003; Spencer, Pagell, Hallion, & Adams, 2002).

Although the explicit rationale for tailoring tends to rely on the underlying psychosocial theory, such as the TTM, some authors have acknowledged secondary mechanisms activated by tailoring. Such explanations suggest that the visible personalization of tailored materials (e.g., the presence of the individual's name and other personal characteristics) increases readers' attentiveness, involvement, and memory of the material and perhaps also enhances

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This study was supported in part by National Cancer Institute Grant R01 CA80706. We thank Paul Jacobsen and Louis Penner for their helpful suggestions.

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self-efficacy and motivation (Brug, Campbell, & Van Assema, 1999; Kreuter & Strecher, 1996; Skinner, Strecher, & Hospers, 1994; Strecher, 1999). These mechanisms have received more direct attention from communication and marketing researchers. Atkin (1994) included personalization as one of the primary communicative dimensions one should consider when writing persuasive health messages. Research on health communications suggests that the use of personalized phrases (e.g., phrases that use *you* or *your*) rather than general references constitutes a message content variable that increases motivation to change via enhanced perceptions of perceived personal susceptibility (Murray-Johnson & Witte, 2003). The direct marketing field has borrowed from communication theory and uses personalization to capture readers' attention (Rosenfield, 1998). Further, marketing researchers have found that the degree of personalization of mailed packages increases response rates (Wham, 1990). In short, the benefits of superficial personalization of materials by the inclusion of names, addresses, and other personal information have been recognized by consumer-oriented fields. Although behavioral researchers may acknowledge these benefits of tailoring, the primary underlying rationale is to stimulate behavior change by altering personally relevant variables identified by a guiding theory of behavior change, such as the TTM.

Efficacy of Tailored Interventions

Tailored interventions have been developed as a tool for promoting a range of health-related behavior changes, such as diet and nutrition, physical activity, cancer prevention, and smoking cessation. Tailored communications appear to be more thoroughly read, better remembered (Brug et al., 1999; Dijkstra et al., 1996; Ryan & Lauver, 2002; Strecher, 1999), and more favorably rated (Kreuter, Bull, Clark, & Oswald, 1999; Ryan & Lauver, 2002) than standard materials, although other studies have found that many recipients failed to read or recall the information (Campbell et al., 1994; Kreuter & Strecher, 1996) or remembered it no better than standard, nontailored information (Dijkstra, De Vries, Roijackers, & Van Breukelen, 1998b). Studies examining the efficacy of tailored interventions for smoking cessation have generally found tailored interventions to be more effective than no-intervention control conditions (Dijkstra, De Vries, & Roijackers 1998a, 1998b, 1999; Prochaska et al., 2001). However, comparisons with standard interventions have produced less consistent findings, with some studies showing superior outcomes with tailored materials (Dijkstra et al., 1999; Prochaska, DiClemente, Velicer, & Rossi, 1993; Shiffman, Paty, Rohay, Di Marino, & Gitchell, 2000, 2001; Velicer et al., 1993) and others finding no significant differences (Aveyard et al., 2003; Curry, McBride, Grothaus, Louie, & Wagner, 1995; Dijkstra, De Vries, Roijackers, & Van Breukelen, 1998b) or even poorer outcomes (Lennox et al., 2001). Moreover, other work has found that appropriately targeted nontailored materials are equally effective or better at capturing attention, being evaluated as informative and useful (Kreuter et al., 2000), and promoting smoking cessation (Lennox et al., 2001).

Although several reviews of the efficacy of tailored smoking cessation materials have found a modest yet significant effect of tailoring (Lancaster & Stead, 2003; Skinner, Campbell, Rimer, Curry, & Prochaska, 1999; Strecher, 1999), other work has not found this to be the case (Ryan & Lauver, 2002). Further, methodological limitations within much of the tailoring literature atten-

uate confidence in these conclusions and limit insight into the mechanisms responsible for any benefit of tailoring. For example, many studies have lacked a comparison group to control for the amount of information provided by the tailoring intervention (e.g., Shiffman et al., 2000, 2001; Velicer et al., 1993; Velicer, Prochaska, Fava, Laforge, & Rossi, 1999). Other work failed to include standard, nontailored control conditions, making it impossible to conclude that the tailoring per se was responsible for favorable outcomes (Dijkstra, De Vries, & Roijackers, 1998a, 1998b; Dijkstra, De Vries, Roijackers, & Van Breukelen, 1998a; Prochaska et al., 2001). In addition, few studies of tailoring smoking cessation interventions included a nontailored yet personalized (e.g., recipients' names and demographic information included in the materials) intervention to control for the simple effect of personalization. The issue of the personalization confound has also been raised by others who acknowledge that the results of tailoring studies have been unclear (Kreuter & Strecher, 1996; Weinstein, Lyon, Sandman, & Cuite, 1998). In a direct test of the personalization effect, Bull, Kreuter, and Scharff (1999) found that physical activity outcomes were not improved by a personalized brochure compared with a nonpersonalized standard brochure, and both were inferior to a tailored brochure. However, the personalization was minimal (the patient's name on the first page) and therefore did not fully control for the degree of personalization inherent in a tailored intervention.

In addition, the effect of a tailored intervention may be moderated by the readers' expectancies or implicit theory about tailoring. That is, individuals who hold highly positive expectancies about tailoring (i.e., that materials designed especially for them should be more beneficial than materials designed for the general public) might attend more to a tailored intervention than individuals who hold neutral or negative expectancies about tailoring. In fact, given evidence that expectancies not only motivate behavior (cf. Bandura, 1977) but also influence responses to stimuli (Kirsch, 1985), individuals with positive expectancies about tailoring might receive greater benefit from materials they believe to be tailored for them, independently of any effect due to the construct tailoring itself. This expectancy effect might occur even when the construct tailoring is itself inert or when it does not exist at all. This is akin to the familiar placebo effect produced when individuals are falsely led to believe that they received alcohol or other drugs. This effect has been systematically examined in studies that varied the instructional set provided to participants (i.e., they were told either that they would be receiving an active drug or that they would be receiving a placebo) and then assessed their responses to the provided product. Participants who were falsely led to believe that they consumed a drug tend to react in accordance with anticipated effects across many (but not all) assessed response domains (e.g., Hull & Bond, 1986; Juliano & Brandon, 2002; Lotshaw, Bradley, & Brooks, 1996). Moreover, the magnitude of these responses has been found to be moderated by participants' previously measured expectancies about the drug (Fillmore, Carscadden, & Vogel-Sprott, 1998; Fillmore & Vogel-Sprott, 1995; Juliano & Brandon, 2002). For example, Juliano and Brandon (2002) manipulated the instructional set about the nicotine content of cigarettes smoked during an anxiety induction. They found that participants' previously assessed expectancies about tobacco's anxiolytic effects moderated the effect of the instructional set manipulation on anxiety reduction. That is, participants who were told that they were smoking regular nicotine cigarettes reported greater anxiety

reduction than those told they were smoking placebo cigarettes (regardless of the actual nicotine content) if they held the expectancy that smoking reduced anxiety. Previous research on tailored interventions has not examined whether similar expectancy effects influence the apparent efficacy of tailored interventions.

The Current Study

The current study adapts a placebo design from drug research to address two questions: (a) Does personalization alone (rather than the behavioral construct-based individualized content) contribute to the effects of tailored interventions? (b) If simple personalization does influence the effects of tailored interventions, is this due to individuals' expectancies about tailoring? That is, do tailored interventions produce a placebo effect that is independent of any effect of the theory-based content of the tailored message? Dependent measures include participants' evaluation of the materials as well as two cognitive variables central to most theories of health behavior change as applied to smoking cessation: readiness to quit smoking and perceived cessation self-efficacy.

We address the first research question by comparing three variations of a smoking cessation booklet: a standard booklet, a minimally personalized booklet (containing the participant's name on the cover), and an extensively personalized booklet. Aside from the degree of superficial personalization contained in the latter two booklets, the content of all three booklets was identical. That is, no actual construct-based tailoring was included. However, participants who received the personalized booklets were told that the materials had been tailored to their individual needs on the basis of their responses to a baseline questionnaire. Thus, the personalized booklets could be described as placebo tailored. Again borrowing from the drug research literature, we hypothesized a dose-response effect based on the degree of apparent tailoring, such that the most highly personalized booklet would produce the greatest effect on the dependent measures.

We address the second research question more directly by examining whether a baseline measure of tailoring-related expectancies moderated any differential effects across the three conditions. We hypothesized that we would find a moderator effect such that level of personalization would produce the greatest effect among those participants who held the strongest tailoring-related expectancies.

Method

Participants

Participants were recruited via newspaper advertisements offering smoking cessation information. Inclusion criteria required that individuals were between 18 and 65 years of age, smoked an average of at least 10 cigarettes per day, had a current mailing address, were able to read English, were interested in quitting smoking within the next 12 months, and were not currently attending a formal treatment program. An a priori sample size analysis determined that for the main analyses of group differences a final sample of 201 participants was needed to achieve power of .80 to detect a small to medium effect size (Cohen, 1988), using alphas of .05 and two-tailed analyses. The target sample size also provided a power of .89 for testing the interactions predicted via multiple regression if the interaction term accounted for 5% of the variance. Of 439 callers, 356 met the inclusion criteria and were sent the baseline questionnaires. Two hundred eighty-two participants (79%) returned the baseline questionnaires and were randomly assigned to the standard ($n = 92$), the minimal-

personalization ($n = 96$), or the extensive-personalization ($n = 94$) condition. The follow-up questionnaire was returned by 240 of these participants, which exceeded the target sample size.

Measures

Smoking information. The smoking information battery assessed smoking status and history and included the Fagerström Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerström, 1991). Also included were 10 additional smoking-related items to support the tailoring deception.

General smoking questionnaire. To support the illusion of tailoring, this 10-item measure developed for the study included questions pertaining to general smoking behaviors that most participants were likely to endorse. Sample items are "Do you often have a craving for a cigarette early in the morning?" "Do you often use cigarettes to control your mood?" and "Are you worried about gaining weight after quitting?" This instrument was included simply to increase the face validity of the placebo tailoring by providing ostensive data on which, in retrospect, the tailoring might have been based. The items were not scored.

Contemplation Ladder. The Contemplation Ladder (Biener & Abrams, 1991), a 10-point continuous measure, was used to assess readiness to quit smoking. The 10 steps on the ladder range from Step 1, "No thoughts of quitting," to Step 10, "Taking action to quit," and participants were instructed to indicate the number that best described their status. This instrument has been compared with other readiness to quit measures and has been established as a valid predictor of smoking cessation (Biener & Abrams, 1991; Herzog, Abrams, Emmons, & Linnan, 2000).

Smoking Self-Efficacy Questionnaire. The Smoking Self-Efficacy Questionnaire (SEQ-12; Etter, Bergman, Humair, & Perneger, 2000) is a 12-item instrument used to estimate smokers' perceived capacity to avoid smoking under certain potentially high-risk conditions. Smokers indicated their level of temptation to smoke while in high-risk circumstances by using a 5-point Likert scale ranging from 1 (*not at all sure that I would not smoke*) to 5 (*absolutely sure that I would not smoke*). The total scale internal consistency was .91 at baseline and .92 at follow-up.

Tailored Intervention Expectancy Questionnaire. The Tailored Intervention Expectancy Questionnaire (TIE-Q) is an original measure used to assess participants' baseline, subjective expectancies about the value of tailored interventions for smoking cessation, as compared with standard interventions. Participants were asked to indicate, using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), the extent to which they agreed or disagreed with 15 statements, such as the following: "In order for a program to be effective, it should be developed based on my own characteristics and needs," "My smoking habits are just like most people's; I do not require specific and personalized information to help me quit smoking," "I think it would be easier to quit smoking if I participate in a program that is tailored to me," and "I do not think that the majority of smokers need individualized information on ways to quit." High scores indicate positive expectancies about tailoring. The potential range of total scores was 15–75, and the observed range was 23–73, with a mean of 48.26 ($SD = 9.26$). The internal consistency reliability of the measure in the current sample was .84.

Intervention Rating Questionnaire. The Intervention Rating Questionnaire included 20 items comprising three separate scales. Six items from the Client Satisfaction Questionnaire (Attkisson & Greenfield, 1994) were included to examine respondents' overall satisfaction with the Lights Out service. Two items were included as a check of the tailoring manipulation, assessing whether participants believed that the material they received had been tailored especially for them. Twelve items evaluating the actual intervention quality and content were derived from previous tailoring research (Brug, Steenhuis, Van Assema, & De Vries, 1996; Kreuter et al., 2000). The overall content evaluation included questions about the comprehensibility of the booklet, the appeal of specific topics addressed, the level of encouragement provided throughout the content, the appearance of the materials, and whether the information caught the attention of the

reader. The possible range of total scores was 12–60. The internal consistency of the measure in the current sample was .92.

Interventions

The intervention booklets (called *Lights Out*) included information on smoking, smoking cessation, and relapse prevention adapted from previous research (Brandon et al., 2000). The original booklets were developed on the basis of contemporary cognitive-behavioral models of smoking cessation and relapse prevention (e.g., Marlatt & Gordon, 1985) and empirically supported smoking cessation strategies. The booklets were 10 pages and encompassed behavioral and psychoeducational information on smoking cessation, health consequences of smoking, and benefits of quitting. They also incorporated information on coping with smoking urges and enhancing self-efficacy as well as other basic information related to smoking cessation. The booklets used in the three conditions were identical except for the condition-specific features.

Standard condition. The cover letters for the standard condition contained a general welcome to the program and introduced the smoking cessation booklet. The booklets contained no personalized information.

Minimal-personalization condition. The cover letter contained the same information as indicated for the standard condition, plus the following statement: "The information contained in the following report has been prepared for [participant's name], and is based on the information you provided." The introduction of the booklets included a similar statement as well as the participant's name. Otherwise, the booklets were identical to those used in the standard condition.

Extensive-personalization condition. The cover letter was the same as used in the minimal-personalization condition. The content of the intervention booklets was the same as in the other two conditions. However, approximately 50 personalized features were integrated into the booklet to enhance the perception of tailoring. Personal demographic information provided by the participants at baseline was included, such as participants' names (13 occasions), gender (14 occasions), age range (4 occasions), rate of cigarette consumption (2 occasions), length of time smoking (3 occasions), and cigarette brand smoked (2 occasions). We modified the sentence structure in some instances, changing words from the third person to the second person or adding phrases in the second person (e.g., "such as yourself"). The smoking-related content, however, was unaffected by the personalized aspects of the booklets. The intent of the additional personalization of booklets in this group was to create the appearance of a tailored intervention, although no actual construct-based tailoring took place. See

the Appendix for examples of standard versus extensively personalized sentences from the interventions.

Procedure

Trained operators screened callers for study eligibility, and baseline questionnaire packets were immediately mailed to eligible callers. The baseline questionnaire packet included the informed consent, a demographic questionnaire, a smoking information questionnaire, the general smoking questionnaire, the Contemplation Ladder, the SEQ-12, and the TIE-Q. When they returned the baseline questionnaire, participants were randomly assigned to a study condition and sent the condition-specific cover letter and intervention booklet.

Approximately 10 days following the mailing of the booklets, participants were sent a second packet of questionnaires. The postintervention follow-up packet comprised the Contemplation Ladder, the SEQ-12, and the Intervention Rating Questionnaire. Participants were paid \$10 after returning the follow-up packet. Up to two reminder letters were mailed to participants who neglected to return the follow-up packet by 2 and 4 weeks postintervention. Thereafter, attempts were made to complete the follow-up by telephone.

Results

The final sample included the 240 participants who returned the follow-up questionnaire, representing 87% of those in the standard condition, 86% of those in the minimal-personalization condition, and 82% of those in the extensive-personalization condition, $\chi^2(2, N = 282) = 1.14, p = .57$. Table 1 summarizes the baseline characteristics of the sample, which were equivalent across conditions. Mean TIE-Q scores were also equivalent across conditions (47.91, 48.87, and 47.97, for the standard, minimal-personalization, and extensive-personalization conditions, respectively). Attrition analyses revealed only one significant predictor. Study attrition was related to participant age such that participants who returned the follow-up questionnaire were, on average, 4 years older than those who did not (49.38 vs. 45.47, respectively, $p = .02$).

Table 1
Characteristics of Participants Who Completed the Postintervention Follow-Up

Variable	Condition									
	Standard (<i>n</i> = 80)			Minimal personalization (<i>n</i> = 83)			Extensive personalization (<i>n</i> = 77)			
	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%	
Demographics										
Female/male			58/42			63/37			61/49	
Age (years)	50.44	10.01		49.24	10.48		47.87	9.32		
Caucasian			86.30			91.60			93.40	
Smoking history										
Cigarettes/day	25.40	10.57		23.02	9.46		23.66	8.80		
Years smoking	31.18	10.31		29.70	11.19		27.84	11.45		
FTND score	5.30	2.41		5.32	2.26		5.13	2.55		

Note. FTND = Fagerström Test for Nicotine Dependence (Heatherton et al., 1991).

Client Satisfaction

The Client Satisfaction Questionnaire was administered at follow-up to examine respondents' overall satisfaction with the service. A one-way analysis of variance (ANOVA) revealed no differences in general satisfaction with the service offered, $F(2, 237) = 1.41, p = .24$.

Manipulation Check

The experimental design of the study required that two groups of participants be deceived about the nature of the smoking cessation booklet they received. A one-way ANOVA of the two-item manipulation check scale indicated that the manipulation was effective, $F(2, 237) = 11.70, p < .001$. Participants in the extensive-personalization group ($M = 7.10, SD = 1.62$) were significantly more convinced that the information was tailored to their needs than were those in the minimal-personalization ($M = 6.26, SD = 1.89$) and standard groups ($M = 5.76, SD = 1.71$), $p < .01$. A comparison between the minimal-personalization and standard conditions revealed a marginally significant difference in the belief that the information was tailored ($p = .06$).

Self-Reported Use, Reading, and Recall of the Intervention

Group membership did not significantly influence whether participants reported that they used the materials. Across the three conditions, equivalent percentages of participants reported that they read most or all of the booklet (80%, 84%, and 79% for the standard, minimal-personalization, and extensive-personalization conditions, respectively), remembered all or most of the content (69% for each of the three conditions), and saved the booklets (84%, 80%, and 77% for the standard, minimal-personalization, and extensive-personalization conditions, respectively).

Evaluations of the Intervention Content

To test the specific a priori predictions regarding the anticipated dose-response pattern of the results, we conducted contrast analyses on the scores for each participant. Contrast analysis is conducted within the context of ANOVA and is used when the research involves specific directional hypotheses that can be tested by comparison with the pattern of the actual data (Rosenthal & Rosnow, 1985; Rosenthal, Rosnow, & Rubin, 2000). The contrast scores indicate the degree to which the observed data are consistent with the predictions. Thus, contrast analyses can offer greater statistical power and clarity of interpretation than traditional ANOVAs. A linear dose-response pattern was tested such that participants in the extensive-personalization condition were expected to produce the most favorable evaluations of the content, followed by those in the minimal-personalization condition, then those in the standard condition. The contrast weights used to represent these predictions were $-1, 0,$ and 1 . As hypothesized, the contrast for the total sample was significant, $t(1) = 3.30, p = .001$, which suggests that the observed pattern of results was consistent with predictions (see Figure 1). The effect size, r , for this result was .21 (Rosenthal & Rosnow, 1985).

To further examine the specific content evaluations that were influenced by the personalization manipulation, we conducted separate contrast analyses of each of the 12 evaluation items, using

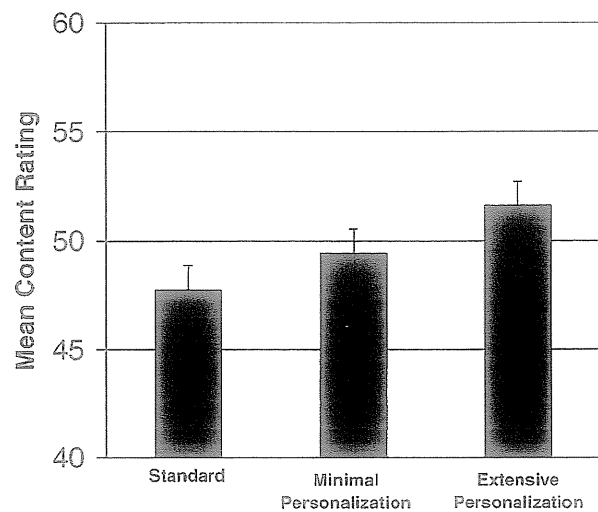


Figure 1. Mean evaluations of content by condition ($p = .00$). Error bars represent standard errors of the means.

an alpha of .10 to identify significant items. This revealed significant differences on 8 of the items: that the information was interesting ($p = .08$), that it applied to the participants' lives ($p = .01$), that it was credible and trustworthy ($p = .01$), that the information about smoking and weight was interesting ($p = .02$), that the information about coping skills was interesting ($p = .05$), that the booklet was encouraging ($p = .05$), that the booklet caught their attention ($p = .03$), and that the appearance was good ($p = .04$). Each of these items showed the expected linear relation between level of personalization and positive evaluation.

Cognitive Responses to the Intervention

Readiness to quit. To test for the predicted pattern of differences in readiness to change, as measured by the Contemplation Ladder, we conducted contrast analyses on the baseline to postintervention follow-up differences across groups. The contrast for the repeated readiness to change measure approached significance, $t(1) = 1.81, p = .07 (r = .12)$, indicating a trend toward greater increases in readiness to quit for participants in the extensive-personalization condition, followed by those in the minimal-personalization and standard conditions, respectively. Table 2 shows unadjusted Contemplation Ladder scores preintervention and postintervention and the difference scores across the two time points.¹

Self-efficacy. As can be seen in Table 2, the mean changes in self-efficacy from baseline to the postintervention follow-up showed the predicted pattern, with the extensive-personalization group having the largest increases in self-efficacy, followed by the minimal-personalization and standard groups. However, the con-

¹ We measured readiness to change rather than actual cessation because we did not expect to find appreciable cessation in response to the single booklet over the short time frame assessed. A question about smoking status included on the follow-up questionnaire yielded abstinence rates of 10%, 6%, and 8% for the standard, minimal-personalization, and extensive-personalization conditions, respectively.

Table 2
Unadjusted Scores Across Time Points and Difference Scores for the Contemplation Ladder and Self-Efficacy Measure

Condition	Baseline		Postintervention		Difference	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Contemplation ladder						
Standard	8.82	1.71	8.44	1.78	-0.387	1.99
Minimal personalization	8.37	1.79	8.26	1.78	-0.107	1.66
Extensive personalization	8.37	1.64	8.53	1.86	0.158	1.99
Self-efficacy						
Standard	31.00	11.93	35.80	11.86	4.25	14.80
Minimal personalization	30.12	11.53	36.67	11.20	6.08	9.20
Extensive personalization	29.27	9.15	36.43	12.25	7.35	12.13

Note. The three conditions were equivalent on both measures at baseline. On the between-groups contrast analyses of pre- to postdifference scores, $p = .07$ for the Contemplation Ladder, and $p = .11$ for self-efficacy.

trast estimate for preintervention to postintervention differences in perceived cessation self-efficacy did not reach significance, $t(1) = 1.58$, $p = .11$ ($r = .10$).

Expectancy as a Moderator

We used the TIE-Q, administered at baseline, to examine whether expectancies for tailored interventions moderated outcomes produced by the experimental manipulation. Specifically, we were interested in three primary outcomes (intervention ratings, readiness to change, and self-efficacy). To test our hypothesis, we conducted multiple regression analyses using procedures outlined by Aiken and West (1991). We centered scores for the continuous predictor variable (TIE-Q; i.e., transformed them into deviation scores, so that the mean was equal to zero). At the first step for each of the regression analyses, we used effect coding to construct two vectors for the categorical condition variable, comparing each experimental condition with the standard condition. We entered the centered scores on the TIE-Q in Step 2 and entered the interaction between condition and TIE-Q scores at Step 3. Of interest was the change in multiple correlation for the model containing the interaction between condition and expectancies for tailored interventions on the dependent variable.

These analyses revealed a significant interaction between experimental condition and expectancies for tailored interventions on readiness to change ($\Delta R^2 = .028$), $F(2, 234) = 3.40$, $p = .03$. As hypothesized, it appears that level of apparent tailoring influenced preintervention to postintervention differences in readiness to change as a function of baseline expectancies for tailored interventions. As shown in Figure 2, the extensive-personalization condition tended to produce the greatest increase in Contemplation Ladder scores among individuals who held positive expectancies about the value of tailored information. In contrast, the other two conditions produced the greatest increase in Contemplation Ladder scores among smokers who held low expectancies about tailoring. That is, participants in the extensive-personalization and standard conditions tended to perform best when they received an intervention that appeared to be consistent with their expectancies about tailoring. The participants in the minimal-personalization condition performed similarly to those in the standard condition. No significant interaction effects were found with the other two outcome variables, content ratings and self-efficacy change.

Discussion

The goal of this study was to determine whether the effect of tailored interventions for smoking cessation might be influenced by factors other than the theoretical constructs on which tailoring is typically based. We hypothesized that the efficacy of tailoring was, in part, due to the degree of personalization, moderated by participants' preexisting expectancies about tailoring—that is, a placebo effect. As with drug studies, we tested this by examining responses to three dosages of personalization (i.e., placebo tailoring): standard untailored, minimal personalization, and extensive personalization. As hypothesized, we found a main effect of personalization dose, indicating that a highly personalized intervention produced the most positive ratings of the usefulness and appeal of the content, followed by the minimally personalized and standard interventions, respectively. There was also a tendency for the more personalized interventions to produce greater increases in readiness to change and perceived cessation self-efficacy. Finally, as hypothesized, tailoring-related expectancies collected at base-

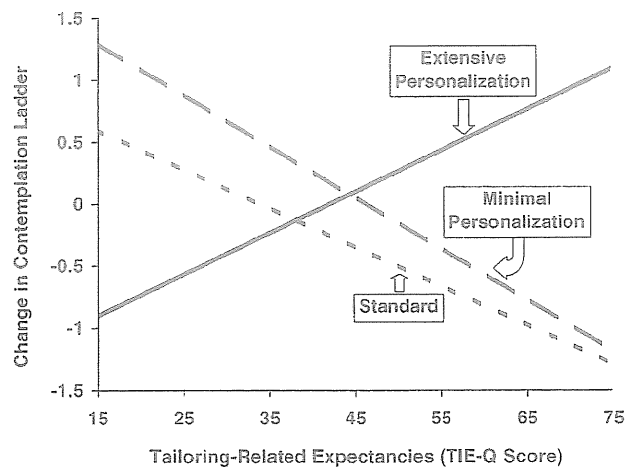


Figure 2. Regression lines by condition, showing interaction between condition and tailoring-related expectancies on Contemplation Ladder change scores ($p = .03$). The range of the x-axis reflects the range of scores on the Tailored Intervention Expectancy Questionnaire (TIE-Q).

line moderated the effect of the interventions on readiness to quit smoking. Individuals who held the strongest positive expectancies about tailoring in general showed the greatest differential benefit of the extensively tailored materials. This interaction between tailoring expectancies and degree of apparent tailoring might have attenuated the main effect of the interventions on readiness to quit. These results provide support for the roles of personalization and expectancies on the outcome of tailored interventions.

It should be underscored that although the results of this study suggest that a placebo effect operates to influence smokers' reactions to tailored interventions, they do not address the magnitude of this effect in relation to any potential effect due to the construct-based tailored content of interventions. It is possible that expectancy effects have relatively little influence on the outcomes of tailored interventions beyond the effects of the true construct-based tailoring. Given, however, the limited existing data in support of tailoring, it is also possible that expectancy effects account for a significant proportion of the benefits of tailored over standard interventions. To parse out the effects of expectancies versus true tailoring requires the use of a placebo-controlled design that includes a true tailoring condition. An even more complete design is the balanced-placebo design, which allows for the independent evaluation of both expectancy effects and direct intervention effects. Generally, this design is used to dismantle the pharmacological versus expectancy-based effects of a drug (e.g., Hull & Bond, 1986; Juliano & Brandon, 2002). However, it could also be applied to determine the source of outcomes due to tailoring. Although a placebo-controlled or balanced-placebo design could be used with tailored interventions for which there exists suggestive evidence of efficacy (e.g., Brug et al., 1996; Campbell et al., 1994; Shiffman et al., 2000; Skinner et al., 1994), these interventions are not in the public domain. Thus, this study represents only the first step, in that it demonstrates that an expectancy effect exists for tailored interventions. Future research is needed to calibrate the degree to which expectancies influence the full effect of tailored interventions.

Systematic research on the mechanisms underlying the effects of tailored interventions is important for several reasons. First, research such as the present study can inform theories of health communication and behavior change. Second, factors that influence the effect of tailored interventions (e.g., expectancies) potentially can be harnessed to increase the efficacy of such interventions. Third, because of the additional cost associated with tailoring, it is necessary to establish that tailoring produces a substantive advantage over standard interventions. Finally, the study of mechanisms can yield information about individual-differences variables that moderate the effects of tailored interventions. Findings from the present study suggest that expectancies about tailoring constitute one such variable. It is somewhat ironic that, whereas the underlying rationale for tailoring is based on the notion of being responsive to individual differences in key theoretical variables, other heretofore ignored individual-differences variables, such as expectancies, may influence the effectiveness of tailoring itself.

There are some applied implications of the finding that expectancies moderate the effect of tailored interventions. For example, it may be possible to match interventions to individuals on the basis of their expectancies. Individuals who hold strong positive expectancies about tailoring would receive tailored materials, whereas those who hold negative expectancies would receive

standard materials. It may also be possible to enhance smokers' positive expectancies about tailoring before a tailored intervention is offered. That is, perhaps smokers could be given an expectancy-enhancing presentation to prepare them to accept a tailored intervention. It is likely that this already occurs to some degree in most materials that introduce a tailored intervention. Alternatively, it may be possible to enhance smokers' expectancies about standard interventions, decreasing their expectancies about the superiority of tailored interventions. (e.g., "We have learned much from the 50 million Americans who have quit smoking before you. Smoking is a physical addiction that has fairly consistent effects across different people. Therefore, the information provided in this booklet should be useful to anyone who is trying to quit smoking.") Such a strategy might increase the efficacy of the less costly standard interventions, reducing the need to invest in tailored interventions.

There were several limitations of this study that one should consider when interpreting its results. First, the sample was a self-selected group of smokers who reported relatively high readiness to quit. It is possible that less motivated smokers, smokers with health problems, or smokers from particular subpopulations (e.g., ethnic groups or age-related groups) would respond differently to placebo-tailored health education information. In the case of smokers less motivated to quit or seek treatment, we would expect to find greater group differences on dependent variables across the three interventions. The high readiness to quit at baseline in the present sample appeared to produce a ceiling effect, limiting the potential impact of the experimental manipulation. In fact, for many participants, readiness appeared to peak at baseline (when they enrolled in the program) and decline to more moderate levels by the follow-up assessment. In addition, although we would expect similar expectancy mechanisms to function in response to tailored interventions for behaviors other than smoking, this remains to be demonstrated.

Second, the intervention was limited to a single booklet. We did not expect that smokers would be greatly affected by a one-time minimal intervention delivered by mail. The U.S. Public Health Service Clinical Practice Guidelines (Fiore et al., 2000) reported that the use of self-help pamphlets is an ineffective intervention. A more intensive intervention would likely produce greater changes in cessation motivation, and it is unknown whether expectancy effects would be stronger or weaker in that case. Also, a more intensive intervention would allow examination of actual behavioral change (i.e., smoking cessation) as an outcome variable in addition to the cognitive variables assessed in this study.

It is also possible that the current tailoring manipulation was not as powerful or convincing as it could have been. The manipulation was limited to 50 personalized features dispersed subtly throughout the 10 pages of materials. A greater degree of apparent tailoring might have produced a stronger placebo effect on outcome measures.

We acknowledge that the effects of simple personalization may be due to more than expectancy effects. That is, greater personalization may produce greater attention to the material and aid information storage and recall, as suggested by the elaboration likelihood model (Petty & Cacioppo, 1984).

However, such mechanisms are also independent of the theoretical construct basis for tailoring. It is also possible that more positive evaluations associated with the personalized materials reflect greater experimental demand or social desirability influences in those conditions. Moreover, the TIE-Q, administered at

baseline, might have led participants to expect a tailored intervention, disappointing those who then received the standard materials and contributing to the observed group differences in evaluation of the intervention. Nevertheless, the moderating effect of baseline expectancies about tailoring suggests that expectancies did play a role in the effect of personalization. It would be useful in future studies to assess cognitive-processing variables (e.g., eye movement, attention, recall of information) as mediators in the evaluation of personalization effects. Such a strategy would also reduce limitations associated with reliance on self-report measures.

In summary, standard smoking cessation materials with an apparently tailored format yielded more favorable evaluations than the same content in a nonpersonalized format. Smokers found the intervention more useful and interesting when they were led to believe that it had been tailored to their needs and contained perceptible individualized features. Moreover, the effect of apparent tailoring on readiness to quit smoking was moderated by participants' preexisting expectancies about the value of tailoring in general. Thus, this study provides support for the role of expectancy effects (or placebo effects) in contributing to outcomes from tailored interventions. This finding expands the study of tailoring mechanisms beyond its usual focus on the underlying motivational theory (e.g., the TTM) to include individual differences related to tailoring itself. Finally, it also suggests that efficacy studies of tailored interventions would be strengthened by the inclusion of placebo controls (i.e., placebo-tailored conditions) to control for simple effects of personalization and expectancies.

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(Appendix follows)

Appendix

Examples of Extensive Personalization

The following statements are examples of those included in the standard booklets and the extensively personalized booklets. The latter was intended to create the appearance of actual tailoring. The personalized variables incorporated number of years smoking, gender, number

of cigarettes smoked daily, brand smoked, age range, participant name, and second-person phrases. The minimally personalized booklets were identical to the standard ones, but the participant's name appeared on the first page.

Standard	Extensive personalization
"This means that your body has become used to the effects of nicotine . . ."	"This means that over the past <i>12</i> years, your body has become used to the effects of nicotine . . ."
"By quitting smoking, you will have taken the most important step that most people can take to improve their health!"	"By quitting smoking, you will have taken the most important step that most <i>women</i> can take to improve their health!"
"Whenever you smoke . . ."	"Whenever you smoke one of your <i>20</i> daily cigarettes . . ."
"You will save money by not smoking the cigarettes you currently smoke per day."	"You will save money by not smoking the <i>20 Marlboro</i> cigarettes you currently smoke per day."
"Quitting smoking is the most important health decision that people can make."	"Quitting smoking is the most important health decision that people in their <i>50s</i> can make."
"So, give yourself a big pat on the back for thinking about taking such an important step toward change."	"So, <i>Mary</i> give yourself a big pat on the back for thinking about taking such an important step toward change."
"Here is a list . . ."	"Here is a list <i>that might work for you.</i> "

Note. Italics denote personalized variables.