

## Tailoring Information to Enhance Quitting in Smokers With Low Motivation to Quit: Three Basic Efficacy Questions

Arie Dijkstra, Hein De Vries, Jolanda Roijackers, and Gerard van Breukelen  
Maastricht University

Tailoring information to a target individual's features is a promising line of development in self-help interventions. In this article, 752 smokers with explicit low intention to quit were randomly assigned to 1 of 5 conditions: (a) multiple tailored letters with self-help guide, (b) multiple tailored letters only, (c) a single tailored letter with a self-help guide, (d) a single tailored letter only, or (e) a nontailored intervention. Follow-up assessment took place 4 months after the intervention. Results indicated that the single tailored intervention only had no surplus value compared with a nontailored look-alike intervention. The addition of a self-help guide to a tailored intervention was only useful in highly dependent smokers, and multiple tailoring was more effective than single tailoring. It remains important to elucidate why and for whom certain tailored interventions are more effective.

**Key words:** smoking cessation, precontemplators, computer tailoring

In the Netherlands, 70% of smokers are not planning to quit within the next 6 months (Mudde, Dolders, & De Vries, 1994). Although the percentage of these so-called precontemplators in the United States is lower (about 40%; Velicer, Hughes, Fava, Prochaska, & DiClemente, 1995), they still compose a significant proportion of the smoking population. Precontemplating smokers have no interest in standardized self-help materials, which are mostly designed for smokers who are preparing to quit. However, by tailoring the content of a smoking cessation intervention to a person's individual features, such as their attitudes and motivational stage, even this group of smokers might be encouraged to quit. Using individual data, a computerized tailoring system can compose complex intervention messages (De Vries, Willemsen, Brug, Dijkstra, & Berben, 1995; Strecher et al., 1994; Velicer et al., 1993). In the literature on computer-generated tailored interventions, three main issues stand out.

The first and fundamental question is whether tailored interventions have higher efficacy than nontailored interventions. The ultimate test to assess whether this is the case is to compare a tailored intervention with a nontailored intervention with the same layout, length, and presentation, and that addresses the same topics. Only a few studies have addressed the problem this thoroughly. The results of these studies can be summarized as follows. Compared with a

nontailored intervention, a tailored intervention led to more forward stage movement only in Black and low-income women (Skinner, Strecher, & Hoshers, 1994), to significantly more quitters only in a group of lighter smokers (Strecher et al., 1994), and to a lesser fat intake (especially in the group of risk consumers) but not to larger changes in fruit and vegetable consumption (Brug, Steenhuis, Van Assema, & De Vries, 1995; also see Campbell et al., 1994). The results show that tailored information can lead to more changes in behavior than nontailored information, but the effect may be limited to certain behaviors and subgroups.

The second question regarding tailoring is whether tailored interventions in combination with a self-help guide have higher efficacy than tailored interventions without this addition. A literature search shows that two forms of tailored interventions are used. The first form of tailored interventions consists of only a few pages of information (De Vries et al., 1995; Kreuter & Strecher, 1996; Owen, Ewins, & Lee, 1989; Strecher et al., 1994). The second form consists of a tailored intervention in combination with a complementary and nontailored self-help manual (Burling et al., 1989; Curry, McBride, Grothaus, Louie, & Wagner, 1995; Curry, Wagner, & Grothaus, 1991; Prochaska, DiClemente, Velicer, & Rossi, 1993). The latter, more extensive intervention could be more powerful. However, as far as we know, no previous research has investigated the effect of tailored information combined with a standardized self-help manual, compared with only tailored information.

The third question is whether multiple tailored interventions have higher efficacy than a single tailored intervention. Offering multiple tailored interventions may provide additional strength to change behavior. For example, the tailored information can be updated each time, and subsequent tailored messages offer the opportunity to give feedback about the direction and extent of changes in determinants of behavior and of behavior itself. Brug, Glanz, Van Assema,

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Arie Dijkstra, Hein De Vries, Jolanda Roijackers, and Gerard van Breukelen, Department of Health Education, Maastricht University, Maastricht, the Netherlands.

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Correspondence concerning this article should be addressed to Arie Dijkstra, who is now at the Department of Clinical and Health Psychology, Leiden University, P.O. Box 9555, 2300 RB Leiden, the Netherlands. Electronic mail may be sent to [dijkstra@rulfsw.leidenuniv.nl](mailto:dijkstra@rulfsw.leidenuniv.nl).

Kok, and Van Breukelen (1998) compared the effects of giving tailored feedback twice with giving tailored feedback once, in a randomized field trial. Giving tailored feedback twice had significantly more effect on fat consumption and vegetable intake than giving it once, although this was not the case for fruit consumption.

The goal of the present study was to analyze whether tailored information had more effect than nontailored information, whether the addition of a standardized self-help guide to a (complementary) tailored intervention had more effect than a tailored intervention alone, and whether multiple tailoring was more effective than single tailoring. The high percentage of smokers with low motivation to quit in the Netherlands warrants the development and testing of effective interventions for this group. Hence, in the present experiment only smokers who were not planning to quit within the next 6 months participated.

## Method

### Recruitment

Smokers were recruited by advertisements in local newspapers throughout the Netherlands, in which they were asked to volunteer for a research project on smoking and smoking cessation. Specific measures were taken to recruit a sample of smokers with low intention to quit. First, in the advertisements the target group was defined as "Smokers who are not planning to quit within the next 6 months, or may be planning to never quit." Second, to minimize a selective sampling, it was stated explicitly that smokers *did not have to quit* to join in the present study. Third, respondents completing all of the questionnaires were offered the opportunity to win 20 bonus prizes amounting to \$100.

After smokers had phoned the university in order to register ( $N = 925$ ), they were sent the pretest questionnaire that could be

returned in a prepaid envelope. After 2 weeks, 795 pretest questionnaires (86%) had been returned. Of these questionnaires, 43 were excluded because the respondents smoked only a pipe or cigars or they did have plans to quit within the next 6 months. This resulted in 752 respondents at Time 1 (T1).

### Design

Smokers were randomly assigned to one of five conditions receiving (a) a tailored letter three times (multiple) with self-help guide (MTplus condition;  $n = 140$ ), (b) three times (multiple) a tailored letter only (MTonly condition;  $n = 156$ ), (c) a single tailored letter with a self-help guide (STplus condition;  $n = 157$ ), (d) a single tailored letter only (STonly condition;  $n = 152$ ), or (e) a single nontailored letter once (NT condition;  $n = 147$ ). Two weeks after the pretest questionnaires were returned (T1), the participants were sent the intervention material (in the MT conditions the first tailored letter) by mail; 4 months after the intervention, participants were sent the posttest questionnaire (T2; see Figure 1).

### Questionnaire

Because the present sample had a low motivation to quit at the start of this study with short follow-up, it was expected that only a few smokers would quit smoking. Hence, behavioral outcome measures were regarded as less appropriate. Stage transition and intention to quit were considered the primary outcome measures (see Velicer, Prochaska, Rossi, & Snow, 1992; Velicer, Rossi, Prochaska, & DiClemente, 1996).

*Stages of change.* Stages of change were assessed by confronting smokers with different time plans with regard to smoking cessation. The present stage model distinguishes between smokers in four stages with increasing readiness to quit: immotives, precontemplators, contemplators, and preparers. Immotives are not planning to quit within the next 5 years or they may be planning never to quit, and precontemplators are planning to quit within the

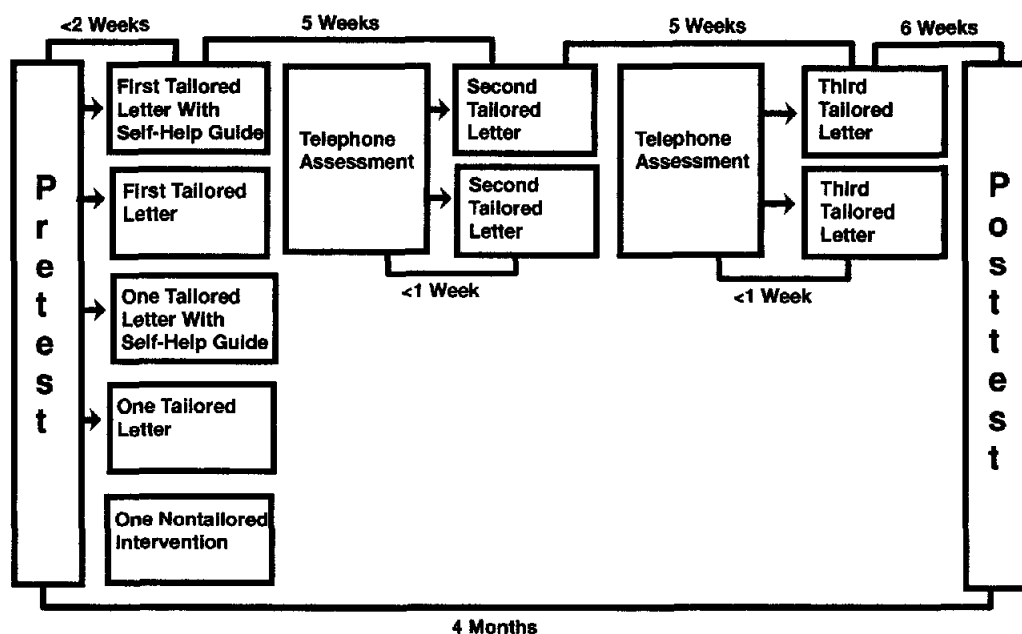


Figure 1. The design of the experiment with five experimental conditions.

next 5 years but not within the next 6 months (Dijkstra, Bakker, & De Vries, 1997; Dijkstra, Roijackers, & De Vries, 1998). Contemplators are planning to quit within the next 6 months, whereas preparers are planning to quit within the next 30 days (Dijkstra, De Vries, & Bakker, 1996; Prochaska, DiClemente, & Norcross, 1992). Smokers who had refrained from smoking for the previous 24 hrs were considered to be in the action stage.

**Stage transition.** Stage transition was assessed by dichotomizing changes in stage: Forward transition was scored as 1, versus no transition or backward transition, which was scored as 0.

**Intention to quit.** Intention to quit was measured with a composite of three 10-point scales: "Do you intend to quit smoking: (a) within the next 6 months, (b) within the next 5 years, (c) ever?" The items could be scored from *not at all* (1) to *very much* (10). The composite intention score was the average item score (range 1–10). Cronbach's reliability ( $\alpha$ ) was .83.

**Quitting behavior.** Quitting behavior was used as an outcome measure. Quitting behavior was first measured by asking participants whether they had engaged in a 24-hr quit attempt since the first measurement (yes or no). Second, a more conservative criterion was used to assess smoking cessation: "Have you smoked in the last 7 days? (even one puff)" (yes or no).

To check whether the randomization procedure was successful with regard to some relevant determinants of quitting behavior, smokers in the five groups at T1 were compared on scale scores on positive and negative outcome expectations, perceived self-efficacy, smoking behavior, and demographics. The individual data were also used as the basis for the tailored interventions.

**Expected outcomes.** A total of 33 items, validated in earlier studies (Dijkstra, De Vries, & Bakker, 1996; Dijkstra et al., 1997), assessed the expected outcomes of quitting (Bandura, 1986). Expected positive outcomes were assessed with a 23-item scale ( $\alpha = .90$ ). Expected negative outcomes were assessed with a 10-item scale ( $\alpha = .82$ ).

**Self-efficacy expectations.** In all, 13 items assessed self-efficacy expectations with regard to the ability to refrain from smoking in social and emotional situations ( $\alpha = .94$ ).

**Heaviness of smoking.** Heaviness of smoking was measured by the Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991), which assesses smoking habits: How much do you smoke? How soon after awaking? Is it hard not to smoke in public places? Do you smoke when you are ill? Do you smoke more in the morning? Which cigarette is most difficult to give up? (range 0–10;  $\alpha = .71$ ).

**Smoking behavior.** Smoking behavior was measured by asking smokers how many years they had been smoking, how many cigarettes they smoked on average, and whether they had engaged in a 24-hr quit attempt in the last 12 months.

**Demographics.** Demographics measured were gender, age, and education level, which was categorized as low, medium, or high.

**Program evaluation.** All of the participants were asked to what extent they had read and remembered the (first) intervention message and to what extent they had learned from it. In the conditions with a self-help guide, participants were asked to what extent they had read the self-help guide and to what extent it had been useful. All of these questions could be scored on a 10-point scale ranging from *not at all* (1) to *a large extent* (10).

No biochemical verification of the self-report quitting behavior was conducted, because first, it was expected that the announcement of a biochemical verification would increase nonresponse and dropout, especially in the present sample with low motivation (see Velicer et al., 1992). Moreover, the present study was characterized by low demand, that is, at recruitment, smokers were told they did

not have to quit smoking; for this reason the self-report was considered to be valid (see Velicer et al., 1992).

## The Tailored Interventions

**General principles.** The computerized system to generate the tailored letters was adapted from previous evaluations of minimal interventions in smokers who were planning (Dijkstra, De Vries, & Roijackers, 1998) and who were not planning to quit (Dijkstra, De Vries, & Roijackers, 1996). The computer program combined several potential parts of the message into one coherent intervention message and provided an attractive layout. Information in the tailored letters was adapted to the individual's stage of change, perceived outcomes, situational self-efficacy levels, and smoking behavior. The letters offered feedback on the item level and included individual information such as the name of the respondent and the number of cigarettes smoked per day. Furthermore, normative feedback was offered.

**Content of the tailored interventions.** Depending on the individual item scores, the letters contained information on possible outcomes of smoking and quitting, such as personal health consequences and social consequences such as appreciation of quitting by a nonsmoking partner. Restructuring information was offered with regard to the expected negative outcomes of quitting, such as weight gain and withdrawal symptoms. Furthermore, the letters contained information on skills to cope with social, emotional, and habitual situations, depending on the individual confidence scores. The letters in the single tailoring conditions consisted of five to seven pages of information.

**Multiple tailored interventions.** The letters in the MT conditions contained roughly the same information as the letters in the ST conditions, but in the former, the information was distributed over the three letters, each comprising four or five pages of information. Each of the three letters contained information on different outcomes of quitting and self-efficacy enhancing information, that is, skills. In the second and third letters in the MT conditions, participants were offered feedback on the extent and the direction of their cognitive changes. In the two MT conditions, the contents of the second and third letters were based on answers to a 10-min telephone questionnaire.

**Tailored interventions plus self-help guide.** In one of both the ST and the MT conditions, the letter(s) referred to the 46-page self-help manual that was sent with the (first) letter. This self-help manual, in color, was developed to be used in a community smoking cessation project (Mudde, De Vries, Willemsen, & Van Assema, 1994). In the tailored letters, participants were referred to a stage-matched chapter in the self-help manual.

## Participant Characteristics

Of the 752 respondents, 60.2% were women; 23.4% had low, 40.4% medium, and 36.2% high education; and the mean age was 39.3 years. On average, they smoked 21.9 cigarettes a day, they had smoked for 21.5 years, the mean FTND score was 5.15 (scale ranging from 0 to 10), and 77.3% were classified as immotiv (22.7% precontemplator). Only 15.2% had engaged in a quit attempt in the past 12 months. With regard to the cognitive measures, the mean scores on the pros and cons of quitting (scales ranging from 0 to 3) were 1.19 and 1.09, respectively. The mean self-efficacy score (scale ranging from -3 to +3) was -0.47, and the mean intention score (scale ranging from 1 to 10) was 3.74.

## Randomization and Attrition

To check the randomization, smokers in the five conditions were compared on the variables mentioned in the participant characteristics section. Chi-square tests for the discrete variables and *F* tests for the continuous variables revealed no differences between the conditions, with one exception. Smokers in the NT condition were classified more often ( $p < .05$ ) as immotivated.

Attrition from T1 to T2 was 19.6% ( $n = 147$ ; MTplus 21.4%; MTonly 12.2%; STplus 17.8%; STonly 25%; NT 21.8%). Logistic regression analysis, with attrition as the dependent variable and the same variables as in the randomization check and condition as independent variables, revealed that dropouts had smoked for fewer years ( $p < .05$ ), dropped out more often ( $p < .05$ ) from the NT condition than from the MTonly condition, and dropped out more often ( $p < .01$ ) from the ST only condition than from the MTonly condition. Attrition in both MT conditions was 7.7% at the first telephone contact and, compared with the first telephone contact, 4.2% at the second telephone contact.

## Statistical Analyses

Logistic regression was used for the binary outcome measures (stage transition, 24-hr quit attempt, and 7 days quit) and linear regression for the quantitative outcome measure (intention to quit). All regression analyses were corrected for sex, age, education, and stage at pretest. Because the intention to quit was not a meaningful measure for participants who had quit smoking, participants who reported having refrained from smoking for the last 24 hr were excluded from the analyses on intention to quit. First, the four tailored conditions were each compared with the nontailored condition. The factor Condition was dummy-coded, using the NT condition as the reference condition with which each other condition was compared. Second, the factor Times (both MT conditions vs. both ST conditions) and the factor Self-Help Guide (SHG; both conditions with SHG vs. both conditions without SHG) were computed. Times, SHG, the interaction Times  $\times$  SHG, and the covariates were entered in the regression equation. The NT condition was excluded from these analyses. If the Times  $\times$  SHG interaction was significant ( $p < .05$ ), the analyses were stratified according to Times, otherwise the interaction was removed from the analysis. If the interaction was not significant, it was removed from equation and the main effects of Times and SHG were tested. In order to study to what extent the effectiveness of the conditions

differed for subgroups of smokers, several interactions were tested. That is, the interactions of Condition with stage, sex, age, education, FTND score, and number of cigarettes were entered in the equations. Because the latter two measures overlap, they were entered separately. In the case of a significant interaction ( $p < .05$ ), the analyses were stratified.

## Results

### Program Evaluation

Table 1 shows the mean scores on the evaluation questions. First, comparing the four tailored conditions to the NT condition, only smokers in the MTonly condition read significantly more of the (first) letter and reported remembering significantly more of it. Smokers in both MT conditions learned significantly more from the letters than did smokers in the NT condition. Second, comparing both MT conditions, smokers in the MTonly condition read significantly more of the first and the third letter. Third, comparing the evaluation of the SHG in both conditions that offered the SHG, no significant difference was found.

### Tailoring Versus Nontailoring

Table 2 depicts the percentages (stage transition, quit attempt, and 7 days quit) and mean scores (intention) on the four outcome measures for each condition. None of the planned interaction tests was significant. Compared with the NT condition, both MT conditions led to higher percentages of transitions (35.2% and 34.6% vs. 18.6%) and to a higher intention to quit ( $M = 15.4$  and  $14.5$  vs.  $12.7$ ). A contrast analysis revealed no significant difference between both MT conditions. The STplus condition and the MTonly condition led to higher percentages of 24-hr quit attempts than did the NT condition (13.4% and 13.1% vs. 6.1%). A contrast analysis revealed no significant difference between both conditions. With regard to the 7-days quit criterion, smokers in the MTonly condition reported, at borderline significance,

Table 1  
Mean Scores on the Program Evaluation Items

Item	Condition				
	MTplus ( $n = 110$ )	MTonly ( $n = 137$ )	STplus ( $n = 129$ )	STonly ( $n = 114$ )	NT ( $n = 115$ )
To what extent (scale of 1 to 10)					
Did you read the letter?	7.73 <sup>b</sup>	8.54 <sup>a</sup>	7.75	7.99	7.63
Do you remember the content?	5.96	6.48 <sup>a</sup>	5.74	5.99	5.66
Did you learn?	5.18 <sup>a</sup>	5.54 <sup>a</sup>	4.68	4.17	4.41
Did you read the second letter?	7.84	8.31			
Did you read the third letter?	7.44 <sup>b</sup>	8.19			
Did you read the self-help guide?	7.13		7.09		
Was the self-help guide beneficial to you?	4.95		4.78		

Note. MTplus = multiple times with self-help guide; MTonly = multiple times a tailored letter only; STplus = a single tailored letter with self-help guide; STonly = a single tailored letter only; NT = a single nontailored letter once.

<sup>a</sup>The evaluation in this condition differed significantly from the evaluation in the NT condition.

<sup>b</sup>Both multiple tailoring conditions differed significantly from each other.

Table 2

Percentages and Means Per Condition of Four Outcome Measures and the Odds Ratios and Betas of the Comparison of the Four Tailored Conditions to the Nontailored Condition

Outcome variable	Condition												
	MTplus (N = 110)			MTonly (N = 137)			STplus (N = 129)			STonly (N = 114)			% NT (N = 115)
	%	OR	95% CI	%	OR	95% CI	%	OR	95% CI	%	OR	95% CI	
Stage transition	35.2	2.43***	1.28–4.62	34.6	2.36***	1.27–4.39	22.8	1.38	0.72–2.66	18.2	1.04	0.51–2.09	18.6
Quit attempt	10.9	2.16	0.76–6.13	13.1	2.66**	1.00–7.11	13.4	2.75**	1.02–7.40	8.8	1.69	0.58–4.92	6.1
7-days quit	1.8	0.69	0.11–4.37	7.4	3.04*	0.79–11.75	0.8	0.30	0.03–3.13	0.9	0.33	0.03–3.41	3.6
	M	$\beta$	SE	M	$\beta$	SE	M	$\beta$	SE	M	$\beta$	SE	M
Intention	15.41	2.63**	0.845	14.52	1.78*	0.821	12.69	0.97	0.817	12.24	–0.52	0.841	12.73

Note. A significant odds ratio (OR) >1.0 means that the percentage in the tailored condition is significantly higher than the percentage in the single nontailored letter (NT) condition (last column). A significant raw beta ( $\beta$ ) means that the mean score in the tailored condition is significantly higher than the mean score in the NT condition. All analyses (but not the means and percentages) are adjusted for stage, gender, age, and education. MTplus = multiple times with self-help guide; MTonly = multiple times a single letter only; STplus = a single letter with self-help guide; STonly = a single tailored letter only; CI = confidence interval.

\* $p < .10$ . \*\* $p < .05$ . \*\*\* $p < .01$ .

having refrained more often from smoking for the past 7 days (7.4% vs. 3.6%).

### Self-Help Guide Versus No Self-Help Guide

In the two-way analyses of all tailored conditions, excluding the NT condition, there was no significant Times  $\times$  SHG interaction with regard to all four outcome measures. Therefore, the main effects of Times and SHG were tested. Table 3 shows the percentages and means of the four outcome measures for the conditions with the SHG and for conditions without the SHG. There was a significant interaction between Condition and FTND score with regard to intention to quit and stage transition: In smokers who scored low on the measure of nicotine dependence ( $\leq 5$ ), the addition of the SHG did not lead to a significantly higher intention or to more stage transition. In smokers with high FTND score ( $> 5$ ), the addition of the SHG did lead to a significantly higher intention to quit ( $M = 11.7$  vs. 14.1) and to significantly more stage transition (20.6% vs. 32.2%).

The data showed a borderline significant ( $p < .1$ ) main effect with regard to the 7-days quit criterion: The addition of an SHG led to fewer quitters (4.4% vs. 1.3%).

### Multiple Tailoring Versus Single Tailoring

Table 3 depicts the percentages and mean scores for both MT conditions and both ST conditions. None of the planned interaction tests was significant. With regard to stage transition, the effect of both MT conditions exceeded that of both ST conditions (34.9% vs. 20.7%). The same pattern was found with regard to the intention to quit ( $M = 15.1$  vs. 13.1) and the 7-days quit criterion (4.9% vs. 0.8%). The MT conditions did not lead to significantly more 24-hr quit attempts than did the ST conditions.

### Analyses Including Dropouts

Because attrition at T2 could be predicted by the number of years smoked, as reported at T1 and by Condition, the present results might be influenced by selective dropout.

Table 3

Percentages and Means of Four Outcome Measures and Odds Ratios and Betas of the Comparison of Multiple and Single Tailoring (Times) and Tailoring With Self-Help Guide (SHG) and Tailoring Without Self-Help Guide

Outcome variable	% without SHG (N = 251)	% with SHG (N = 239)	OR	95% CI	% Multiple (N = 247)	% Single (N = 243)	OR	95% CI
Stage transition					34.9	20.7	2.00***	1.31–3.07
Low FTND ( $\leq 5$ )	28.3	24.8	0.52	0.39–0.47	–	–	–	–
High FTND ( $> 5$ )	20.6	32.2	1.73**	1.00–3.17	–	–	–	–
Quit attempt	11.8	12.2	1.13	0.64–1.99	12.1	10.9	1.12	0.63–1.97
7-days quit	4.4	1.3	0.30*	0.08–1.13	4.9	0.8	5.77**	1.23–27.13
	M	M	$\beta$	SE	M	M	$\beta$	SE
Intention					15.11	13.08	2.00***	0.58
Low FTND ( $\leq 5$ )	15.7	15.4	–0.4	0.76	–	–	–	–
High FTND ( $> 5$ )	11.7	14.1	2.33***	0.88	–	–	–	–

Note. A significant odds ratio (OR) means that the percentages differ significantly. A significant raw beta ( $\beta$ ) means that the mean scores differ significantly. All analyses (but not means and percentages) are adjusted for stage, gender, age, education, and for times in the analyses on SHG and for SHG in the times analysis. FTND = Fagerström Test for Nicotine Dependence; CI = confidence interval.

\* $p < .10$ . \*\* $p < .05$ . \*\*\* $p < .01$ .

One way to address this problem is to use the last known measurement (T1) of each smoker who dropped out as a substitute for the T2 measurement and repeat all analyses. This intention to treat analysis (Heyting, Tolboom, & Essers, 1992) revealed that none of the results changed qualitatively. Only minor changes in betas, odds ratios, and *p* values emerged.

### Discussion

The first question was whether tailored information would lead to more changes than would nontailored information. The strictest comparison was between the single tailored intervention without the SHG and the nontailored look-alike intervention. The data showed that the tailored intervention was not more effective than the nontailored intervention. The results of the program evaluation may shed some light on the causes of this null finding. The program evaluation data show that both single tailored interventions were read and remembered to the same extent as the nontailored intervention. This contrasts with the findings of Skinner et al. (1994) and Campbell et al. (1994) and suggests that the tailoring of the information did not, as expected (Dijkstra, 1996; Skinner et al., 1994), lead to increased curiosity and a resulting enhanced attention to the message. First, the tailored intervention might not have been tailored enough. However, the content was adapted to several individual cognitions, and the intervention contained personal information, such as the name of the respondent, the number of cigarettes smoked a day, the number of years smoked, and the amount of money saved in the case of quitting. Second, the fact that the single tailored intervention was not read and remembered to a larger extent than the nontailored intervention might be caused by the specific sample of smokers with low motivation to quit: All smokers stated they were not planning to quit within the next 6 months, and more than 77% stated they were not planning to quit within the next 5 years. This group can be expected to be highly resistant to intention- and behavior-changing appeals. This resistance may have resulted in the finding that the tailored intervention was not read and remembered to a larger extent than the nontailored intervention.

Both multiple tailored interventions did lead to more stage transition and a higher intention to quit than did the nontailored intervention, and the multiple tailored intervention without the SHG led, in addition, to more quitting behavior than did nontailored information. The power of multiple tailoring was supported in the analyses in which multiple tailoring was compared with single tailoring. The data showed that on three out of four outcome measures, the effect of multiple tailoring exceeded that of single tailoring, whereas the letters in the multiple tailoring conditions contained roughly the same information as the letters in the single tailoring conditions. However, with the present study design, the specific intervention elements that are responsible for this effect of multiple tailoring cannot be identified. For example, the effect of multiple tailoring might be caused by the fact that the information on the pros and cons of quitting and on the use of skills to quit was offered more than

once. However, we do not know to what extent the tailoring of this information was essential. Three subsequent and related but nontailored letters might have similar efficacy. Furthermore, we do not know to what extent the three assessments—one mailed questionnaire and two additional telephone interviews—contributed to the efficacy of multiple tailoring. Future research will have to address this important issue by comparing the effects of a multiple tailoring condition with, for example, the effects of a multiple but nontailored condition and an assessment-only condition.

The addition of a standardized SHG to a tailored intervention led to a higher intention to quit, but, in contradiction, to fewer 7 days quitting (borderline significance) in comparison with a tailored intervention only. The results were more consistent when the analyses were stratified according to nicotine dependence: Only in high nicotine dependent smokers did the addition lead to a higher intention to quit and to more stage transition. Strecher et al. (1994) found that in heavy smokers, tailored messages did not lead to more quitting than standardized or no information. They concluded that heavy smokers need nicotine replacement in addition to a psychosocial intervention. The present findings, however, seem to support the notion that a more extensive psychosocial intervention might be needed to stimulate heavy smokers to quit. Both studies used different outcome measures and might be combined: In the present study, the differential effect for low and highly dependent smokers was found on measures that, in a sample with low motivation to quit, are important in early phases of the process of smoking cessation. Strecher et al. (1994) used the 7-days quit criterion, which is important in later phases of the smoking cessation process. Hence, in motivating heavy smokers to quit, a more extensive psychosocial intervention might be needed, whereas in supporting actual quitting in heavy smokers, additional nicotine replacement might be needed.

In sum, in a critical comparison, the single tailored intervention without the SHG had no surplus value compared with a nontailored look-alike intervention. The addition of an SHG to a tailored intervention was especially useful in highly dependent smokers. Multiple tailoring was clearly more effective than single tailoring.

The present study has its limitations. First, the follow-up time frame was only 4 months. It cannot be ruled out that, for example, the addition of an SHG might be effective in the long run. Second, we do not know how the present sample of mostly immotives compares with other samples with low motivation to quit, as reported by Velicer et al. (1995) and Dijkstra, De Vries, and Roijackers (1996). Consequently, the generalizability of the present results remains unclear. Third, smoking cessation outcomes and the program evaluation were measured at one time point. Hence, the program evaluation might be influenced by changes in intention and behavior. Finally, the present study was designed to test whether certain tailored interventions are more effective than other interventions. In the development of tailored interventions, this kind of research has to be supplemented with studies that try to unravel why some tailored interven-

tions are more effective than others. Furthermore, future research should further address the question of for whom certain tailored interventions are more effective.

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