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Using tailored interventions to enhance smoking cessation among African-Americans at a community health center

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This prospective randomized study examined the impact of three tailored intervention approaches to increase quitting rates among African-American smokers who were clients of a community health center that serves primarily low-income and indigent persons. Smokers were randomized to one of three groups: (1) health care provider prompting intervention alone, (2) health care provider prompting intervention with tailored print communications, and (3) health care provider prompting intervention with tailored print communications and tailored telephone counseling. Among the 160 smokers who completed the study, 35 (21.8%) had quit smoking at follow-up. Smokers who received the provider prompting intervention with tailored print materials were more likely to report having quit than smokers who received the provider intervention alone (32.7% vs. 13.2%, $p < 0.05$). Smokers who received all three intervention components were not more likely to report having quit at follow-up than those who only received the provider intervention (19.2% vs. 13.2%). Smokers who at baseline were less educated, smoked less than half a pack of cigarettes per day, had a stronger desire to quit, felt more efficacious, and had thought about quitting were more likely to report having quit at follow-up. These results provide support for continued refinement of tailored communications to aid smoking cessation among African-American smokers.

Introduction

Based on the 1995 National Health Interview Survey, 29% of African-American men and 24% of African-American women are current smokers (CDC, 1997). Moreover, the smoking patterns of African-Americans differ substantially from Whites. African-Americans, though being lighter smokers, prefer menthol and higher tar and nicotine brand cigarettes (Ahluwalia, 1996; Giovino *et al.*, 1994; Richardson, 1997). This pattern of cigarette use and the higher levels of cotinine may contribute to African-Americans' disproportionately greater risk of smoking-related cancers and cardiovascular diseases compared to other racial groups (Ahluwalia, 1996; Caraballo *et al.*, 1998; Harris, Zang, Anderson & Wynder, 1993; Miller *et al.*, 1996).

Unfortunately, some data suggest that African-Americans are less likely to succeed at cessation despite their greater desire, confidence and more frequent quit attempts than Whites (Ahijevych & Wewers, 1993; Audrian, Gomez-Caminero, Roberston, Boyd, Orleans, & Lerman, 1997; CDC, 1993a; Royce, Horowitz, Corbett, Hartwell, Orlandi & the COMMIT Research Group, 1993). This may be due to their smoking characteristics and/or the fact that few cessation programs have been designed especially for African-Africans (Ahluwalia, 1996). We report on the efficacy of tailored approaches of varying intensity applied within a community health center to motivate low-income African-Americans to quit smoking. Specifically, these tailored approaches included: (1) a tailored prompting system to encourage health providers to advise quitting smoking and to provide appropriate support, (2) tailored print communications, and (3) tailored telephone counseling. We briefly review the efficacy of these approaches in enhancing smoking cessation.

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Tailored approaches to smoking cessation

Approximately 70% of smokers make outpatient visits to physicians or other health professionals at least once a year (CDC, 1993b). These visits provide ideal situations for health professionals to provide brief counseling and urge patients to quit. Minimal health professional interventions of 5 min or less have resulted in modest cessation rates of 5–10%, and have been recommended as part of the AHCPR smoking cessation guideline (CDC, 1993b; Fiore, 1997). Moreover, and as the guideline stressed, more intensive interventions achieve higher cessation rates. Adjuncts, such as provider prompting systems and cues (Yarnall *et al.*, 1998), telephone counseling (Curry, 1993; Curry, McBride, Grothaus, & Louie, 1995; Lichenstein, Glasgow, Lando, Ossip-Klein, & Boles, 1996; McBride & Rimer, in press), and tailored print communications (Prochaska, DiClemente, Velicer, & Rossi, 1993; Strecher, Kreuter, Den Boer, Kobrin, Hospers, & Skinner, 1994) may increase the likelihood of quitting. Tailored approaches are individualized to smokers based on information about their smoking behavior and other relevant variables (Rimer & Glassman, 1998). In previous research on mammography, tailored print materials were more likely to be retained and remembered by African-American women (Skinner, Strecher & Hospers, 1994).

Our goal was to develop and test the efficacy of different types of tailored interventions that could be used within the Lincoln Community Health Center (LCHC), a community health center that serves primarily low-income and indigent African-American clients in Durham, NC.

Theoretical model

The research was guided by the Transtheoretical or Stages of Change Model (Prochaska, Redding & Evers, 1997), a social psychological model developed to explain the change process with regard to smoking and other addictive behaviors. According to the model, the stages of change include pre-contemplation (not thinking about change), contemplation (thinking about change in the next 6 months), preparation (taking active steps to change), action (having maintained behavioral change for a period of 6 months), and maintenance (having maintained behavioral change for over 6 months). Advancement through these stages is partly mediated by a person's perceptions of the pros and cons of behavioral change, and their overall weighting, called decisional balance (Prochaska *et al.*, 1997). Across several health behaviors, including smoking, the pros for changing the behavior are higher among contemplators than pre-contemplators, and the cons for change are lower among individuals in the action than in the contemplation stage (Prochaska *et al.*, 1994). Among a sample of rural African-Americans, Schorling (1995) found the pros of smoking to be higher among pre-contemplators than contemplators, while the cons of smoking were higher among contemplators than pre-contemplators. Moreover, self-efficacy beliefs increased progressively from pre-contemplation to action.

For intervention purposes, tailored communications should: (1) increase the pros of change to advance smokers from pre-contemplation to contemplation, (2) decrease the cons (i.e., barriers) to advance smokers from contemplation to action, and (3) enhance self-efficacy (Prochaska *et al.*, 1994). Thus, our materials were tailored to these constructs. However, this study was not designed to test the theory, and time constraints precluded asking questions for some important processes that contribute to movement among stages (e.g., the Processes of Change Scale).

Study hypotheses

This study examined the relative effectiveness of using an additive approach to interventions to enhance smoking cessation among African-American smokers at the Lincoln Community Health Center. Participants were randomized to one of three groups: (1) health provider prompting intervention alone, (2) health care provider prompting intervention and tailored print self-help communications, and (3) health care provider prompting intervention with tailored print self-help communications and tailored telephone counseling. It was expected that the latter two groups would be more effective at enhancing cessation than the provider prompting intervention alone. Moreover, it was hypothesized that individuals who received telephone counseling in addition to tailored print communications would have higher quit rates than individuals who received tailored print materials without the counseling.

We also expected several key constructs to predict cessation. Specifically, individuals who expressed more pros and fewer cons (i.e., barriers) and held stronger self-efficacy beliefs should be more likely to report having quit smoking at follow-up. We also expected that the interventions would increase pro and self-efficacy beliefs, while lowering barriers to quitting.

Methods

Study population

Participants in this study were patients who used the Lincoln Community Health Center (LCHC) in Durham, North Carolina in 1993 as their primary source of health care. The LCHC serves approximately 30% of the Durham African-American population, and is considered to be the most important provider of health care for low-income and indigent individuals. Costs for services are based on a sliding scale.

Before starting the study, we obtained a random sample of 3490 adult patients of LCHC, aged 18 and

older, who had visited the center within the 18 months prior to November 1993. Of the 3490 names in the original sample, 1071 were deleted, because they represented disconnected or wrong numbers. There were 2419 persons in the corrected sample; 22% could not be contacted after numerous attempts, 4% had serious hearing problems, and 3% refused to be interviewed for a baseline interview. The final sample consisted of 1318 men and women at baseline. Based on the baseline interview, which was conducted in 1994, prior to the start of the intervention, 266 were African-American smokers. These smokers were randomly assigned to one of the three study groups: provider intervention, provider intervention and tailored print communications, and provider intervention with tailored print communications and telephone counseling (described in detail below).

A final follow-up telephone interview was conducted 16 months after participants received their last intervention. Among the original 266 smokers, nine were deceased by the date of the final interview, resulting in 257 participants eligible for follow-up phone interview. Of these 257, 160 were contacted and completed the final interview. Loss to follow-up was due primarily to disconnected phone numbers with no forwarding number (86%); poor health conditions, such as stroke (14%); only 3% refused to participate. Thus, 62% of the participants who completed the baseline interview completed the follow-up interview.

There were no significant differences in any demographic, psychosocial (e.g., self-efficacy, barriers to quitting) or smoking habit variables between those who completed the baseline and those who completed the final interview. Of the 160 smokers, there were 53, 55, and 52 in the provider prompting intervention, provider prompting intervention and tailored print communications, and provider prompting intervention with tailored print communications and telephone counseling intervention arms, respectively. Loss to follow-up did not appear to be a function of any demographic, psychosocial or smoking pattern; nor was it a function of the intervention smokers received. Descriptive statistics on the demographic variables are presented in Table 1 for participants at baseline and for those who completed the follow-up interview.

Study interventions

All interventions were individualized based on a patient's stage and other relevant information. Moreover, the intervention groups were cumulative so that each successive group also received the previous interventions. We selected interventions that were appropriate in view of the scarce resources of community health centers, and thus, potentially replicable and disseminable. The interventions are described briefly here.

1. Provider prompting intervention. The Medical Record (TMR), a comprehensive computer system with a computerized health maintenance tracking system developed at Duke University Medical Center, was adapted to meet the needs of the LCHC (Yarnall *et al.*, 1998). Working with physicians at the LCHC, we developed a tailored, computerized prompting system that generated printed physician prompts that were attached to the patient's chart. The prompt form contains patient demographics, an area for clinicians to record their provider identification numbers and clinic name, and age- and sex-specific prompts for tests or procedures (e.g., mammograms, Pap tests). In addition, there are cues to prompt clinicians to provide patients with stage-based behavioral messages. Providers were trained and asked to follow the Ask-Advise-Assist-Arrange Follow-Up model (i.e., 4As) developed by the National Cancer Institute to promote smoking cessation (Manley, Epps, Husten, Glynn, & Shopland, 1991). Initial 5-month provider compliance was 55%, with an average compliance rate of 48% by study end (Yarnall *et al.*, 1998).

2. Tailored print communications (TPCs) were sent to patients around the time of their birthdays; thus, the project's name, *Healthy Birthdays.* The first was an oversized ($7 \times 8\frac{1}{2}$ in opening $8\frac{1}{2} \times 14$ in) tailored birthday card with a picture of the clinic staff on the cover; the second version was a personalized $8\frac{1}{2} \times 11$ in *Healthy Birthdays* newsletter. Both TPCs were written at the 5th grade reading level. In addition, the messages were written with the realities of the clients' lives in mind. For example, the section on transportation barriers to a follow-up doctor's appointment included information about buses and bus routes. Messages about life stresses reflected the fact that a majority of the clients were low-income or indigent. Religious and familial themes also were included. In addition, the art was especially tailored for African-Americans, using graphics designed by a local African-American artist. The graphics also were tailored for gender so

Table 1. Demographic characteristics of participants at baseline and at follow-up

	Baseline		Follow-up	
Characteristic	*n*	%	*n*	%
Age				
18–49	149	56	81	51
50+	117	44	79	49
Sex				
Male	122	46	77	48
Female	144	54	83	52
Education				
0–11 years of education	205	77	115	72
12+ years of education	61	23	45	28
Married/living as married	84	32	52	32
Works for pay	126	47	70	44
Has health insurance	153	58	107	70

Note. There were 266 participants at baseline and 160 participants at follow-up.

that men and women received different images. The TPCs were pre-tested extensively with the target population.

Data from the baseline surveys were combined with information from TMR and a library of specific messages designed to respond to different variables and provide specific recommendations to help participants think about their smoking and quit smoking. The categories of tailoring variables from which the messages were derived included but were not limited to: barriers to quitting smoking, previous attempts to quit, whether addicted, pros and cons of smoking, smoking characteristics (which were addressed individually), and several patient characteristics, such as race, gender and age. The tailoring variables resulted in over seven billion possible combinations of messages for any given smoker. This number is based on the fact that we wrote special messages for each of 18 possible barriers (given three response options) and 18 facilitators (given three response options), as well as five stages of change, four levels of readiness to quit, and two levels of addiction in addition to age, race, and gender, and several other tailoring variables. (See Rimer & Glassman, 1998 for a more detailed description.)

3. Tailored telephone counseling. Following successful brief telephone counseling models that have been used in the past (Morgan, Noll, Orleans, Rimer, Amfoh, & Bonney, 1996; Rimer *et al.*, 1992), we developed a structured protocol to counsel smokers. The protocol was paper-based and provided different messages depending on such factors as a person's reasons for quitting or not quitting, whether he/she was addicted, and previous quit attempts. Men received only one call per year. Women could receive two calls if they were due for breast or cervical cancer screening, and were also smokers. The female counselor identified the smoker's current smoking status and attempted to motivate stage-based movement towards quitting. The counselor also was expected to identify and attempt to overcome individual barriers to quitting smoking and to reinforce reasons for quitting.

All counselors were trained using a standardized protocol that included about a week of small group discussion about addiction and smoking behavior, issues related to quitting and special concerns specific to the study population. Then, the prospective counselors listened to the project manager conduct calls, after which they practiced among themselves and then called senior project staff who rated the callers' performances and provided feedback. The counselors also were provided a notebook of articles and other materials to read. Regular meetings of the counselors were held every 2 weeks initially and then monthly to review counseling strategies and provide feedback. Call monitoring was done regularly by project staff to assure that the counseling was conducted as intended. The mean call length was about 6 min.

Study variables

Instrument. All interviews were conducted by professional telephone interviewers under the direction of Survey Research Associates using computer assisted telephone interviewing. All interviewers were required to attend a rigorous training program. The survey (mean length = 10 min) covered demographic characteristics, such as age, race, gender, medical history, and socioeconomic status. The socioeconomic variables included education and insurance status, which initially served as proxies for income. Income was not assessed at baseline because of strong negative reactions to income-related questions during pre-testing.

Questions about smoking were taken from the 1990 Disease Prevention and Health Promotion Supplement to the NHIS and were asked in standardized, previously validated ways. Participants were asked: (1) whether they smoked during the last 7 and/or 30 days, even a puff, (2) how many cigarettes they smoked per day, (3) as a measure of addiction from the Fagerström Scale (Fagerström, 1978), whether they smoked their first cigarette within 30 min or less of waking (yes/no). To assess desire to quit, participants were asked how much they wanted to quit smoking (not much at all, slightly, somewhat, quite a bit, and very much). Self-efficacy was assessed as in other studies on smoking cessation (DiClemente, 1986; Maddux, 1995; Schorling, 1995) by asking participants how confident they felt about quitting smoking for good (not at all, slightly, somewhat, quite a bit or extremely). Desire to quit and self-efficacy were reassessed at follow-up only among participants who did not quit at follow-up.

Stage of change was assessed at baseline by asking participants if they were thinking of quitting smoking in the next 6 months. Those who said yes were staged as contemplators. We could not clearly differentiate participants in the contemplation vs. preparation stage.

To assess decisional balance, participants were asked to agree or disagree with a series of statements reflecting positive or negative attitudes toward smoking. There were three pro and con statements developed by the research team. The pro items included: *smoking cigarettes relieves tension*; *smoking helps me concentrate to do better work*; *you are relaxed and more pleasant when you smoke*. The con items included: *you are embarrassed that you smoke*; *my cigarette smoking bothers other people*; *people think you are not smart for ignoring the warning signs about cigarette smoking*. An overall decisional balance score for smoking was computed by assigning a score of 1 to "agree" and -1 to "disagree", then subtracting the total scores on the "con" statements from the total scores on the "pro" statements. However, due to relatively low reliabilities of the pro and especially the con scale (Cronbach alphas of 0.59 and 0.42, respectively), we chose to analyze the pros and cons as separate items. The pro and con items were assessed at follow-up among participants who had not quit smoking.

Table 2. Smoking patterns and psychosocial characteristics of participants at baseline and at follow-up

Characteristic	Baseline		Follow-up	
	n	%	*n*	%
Stage of change				
Pre-contemplators	69	25.9	34	27.2
Contemplators	197	74.1	91	72.8
Number of cigarettes smoked per day				
< 10	127	47.7	51	40.8
11 +	139	52.3	74	59.2
Timing of first cigarette				
< 30 min	140	55.3	70	56.5
> 30 min	113	44.7	54	43.5
Self efficacy				
None to somewhat confident	153	58.0	63	51.6
Quite a bit to very confident	111	42.0	59	48.3
Desire to quit				
None to somewhat	95	35.7	50	40.0
Quite a bit to very	171	64.3	75	60.0
Pros of smoking				
Smoking relieves tension	206	77.4	91	72.8
Smoking helps you concentrate	97	36.6	45	36.3
You are more relaxed when you smoke	188	70.7	87	69.6
Cons of smoking				
You are embarrassed that you smoke	65	24.4	47	37.6
Your smoking bothers others	187	70.3	90	72.6
People think you are not smart for smoking	149	56.0	82	67.2
Barriers to quit smoking				
Boredom	75	28.0	44	36.7
Losing a pleasure	77	29.0	45	37.2
Problems concentrating	43	16.0	25	20.7
Gain weight	113	43.0	52	43.0
Being nervous*	107	40.0	—	
Being irritable*	101	38.0	—	

Note. These measures were asked only of the 125 smokers at follow-up.
* Was asked only at baseline.

In addition to the pros and cons, participants were asked about six potential barriers to quitting used in previous research (Rimer, Orleans, Keintz, Cristinzio, & Fleisher, 1990; Tessaro *et al.*, 1997). They were asked whether boredom, losing a pleasure, problems in concentration, gaining weight, being nervous or tense, and being irritable would pose problems (yes/no). The six items were summed to create a barriers to quitting scale (alpha = 0.71, scores ranged from 0–6). These questions were assessed at follow-up among participants who had not quit smoking. Descriptive statistics on the psychosocial variables at baseline and follow-up are reported in Table 2.

Results

Overview

We first present the results pertaining to which of the baseline variables individually predicted self-reported smoking cessation at follow-up, defined as not having smoked within the last 30 days. Self-report of smoking cessation corresponds closely with biochemical verification of smoking status (Velicer, Prochaska, Rossi, & Snow, 1992). We then present the results indicating which of the variables significant at the univariate level predicted smoking cessation in multivariate analyses. We then summarize data as to whether the intervention affected the pros and cons of change, self-efficacy, and desire to quit. Participants' reactions toward the printed materials and telephone counseling, which were overwhelmingly positive, can be obtained from the first author upon request. Reactions did not predict cessation.

Predictors of smoking cessation

Of the 160 participants reached at follow-up, 35 (21.8%) had quit smoking. Using chi-square tests, we examined whether any demographic variables predicted smoking cessation. The significant findings ($p < 0.05$) are presented in Table 3. Education was the only significant demographic predictor of smoking cessation. Participants who were less educated were more likely to have quit smoking at follow-up.

We next examined in bivariate analyses whether the baseline psychosocial and smoking habit variables (stage, number, level of addiction) predicted cessation. Individuals who were contemplators smoked less than or equal to 10 cigarettes per day at baseline, felt highly efficacious, and had a strong desire to quit, were most likely to have quit smoking at follow-up (see Table 3). Baseline perceptions of the pros and cons of smoking did not predict cessation at follow-up (data not shown), nor did perceived barriers at baseline predict cessation at follow-up (data not shown).

We then examined whether the intervention had any effect on smoking cessation. It was predicted that cess-

Table 3. Baseline bivariate predictors of smoking cessation

Predictor	Quitters (*n* = 35)	Smokers (*n* = 125)	$\chi^{2\wedge}$
Demographics			
Education			
0–11 years	57.1 (20)	76.0 (95)	
12 +	42.9 (15)	24.0 (30)	4.78*
Smoking pattern variables			
Stage of change			
Pre-contemplators	8.6 (3)	32.0 (40)	
Contemplators	91.4 (32)	68.0 (85)	7.59**
Cigarettes smoked per day			
< 10	65.7 (23)	40.0 (51)	
11 +	34.3 (12)	59.2 (74)	6.78**
Psychosocial predictors			
Self-efficacy			
None to somewhat confident	40.0 (14)	66.4 (83)	
Quite a bit to very confident	60.0 (21)	33.6 (42)	7.93**
Desire to quit			
None to somewhat	17.1 (6)	40.0 (50)	
Quite a bit to very	82.9 (29)	60.0 (75)	6.24*

*$p < 0.05$; ** $p < 0.01$.

ation rates would increase as a function of intervention intensity with the highest cessation rates expected among those who received the provider prompting intervention with tailored print materials and tailored telephone counseling. The bivariate relationships indicated partial support for this hypothesis. Those who received the provider prompting intervention and tailored print materials were more likely to have quit at follow-up ($n = 18$, 32.7%) than those who were in the provider prompting intervention group alone ($n = 7$, 13.2%), or those who received all three levels of the intervention ($n = 10$, 19.2%, χ^2 (2, $N = 10$) = 6.3, $p < 0.05$).

To assess whether loss to follow-up affected any of the reported bivariate relationships, we reran these analyses assuming that those who were lost to follow-up continued to smoke. The overall findings were not significantly altered except for two outcomes. Age and marital status became significant predictors of cessation. Individuals who were older and married or living as married were more likely to have quit smoking ($p < 0.05$). No other significant effects were found.

Multivariate predictors of cessation

We then examined whether the interventions predicted smoking cessation after controlling for education, psychosocial and smoking habit variables that were significant in the bivariate analyses. Due to the small sample size of smokers who quit, multivariate logistic regression analyses were conducted, controlling for each of the demographic and psychosocial variables individually in the model with the intervention groups. Hence, since there were five significant univariate predictors of cessation (see Table 3), five separate multivariate logistic regression analyses were conducted. In all of these analyses, the other two interventions were compared to the provider prompting intervention alone.

After controlling in separate models for education, stage of change, desire to quit, self-efficacy, and number of cigarettes smoked on average per day, individuals who received the combination of provider prompting intervention and tailored print materials were more likely to have quit smoking at follow-up than those who were in the provider prompting intervention group only (odds ratio, OR, from 2.71 to 6.56). In addition, education, stage of change, desire to quit, self-efficacy, and number of cigarettes smoked on average per day continued to predict cessation with intervention group in the model. Those who were less educated were more likely to have quit than smokers with more education (OR = 3.07). Individuals who were contemplators at baseline were more likely to have quit than pre-contemplators (OR = 8.52). Those who reported greater self-efficacy and had a stronger desire to quit were more likely to have quit at follow-up than individuals who reported low to moderate levels of self-efficacy, or who had no to moderate desire to quit, respectively [OR = 2.65 (self-efficacy); OR = 3.37 (desire to quit)]. Those who smoked more than 10 cigarettes per day at baseline were less likely to have quit than individuals who smoked 10 or fewer cigarettes per day (OR = 0.41).

Intervention effects on the psychosocial variables and desire to quit

At follow-up, participants who continued to smoke were asked about the pros and cons of smoking, self-efficacy beliefs and desire to quit. These outcomes were unaffected by intervention modality using the general association chi-square (all $ps > 0.10$).

Discussion

The major aim of this study was to assess the effects of using varying levels of tailored information to help low-income African-American smokers in a community health setting quit smoking. Overall, the results provide encouraging support for the use of tailored print communications with this population. Compared to the provider prompting intervention alone, the least intensive intervention, or those who received all three intervention components, the most intensive intervention, smokers who were in the provider prompting intervention group and received tailored print communications were more likely to report having quit at follow-up.

Our 32.7% quit rate using tailored printed materials compares favorably with recent studies using tailored interventions with African-American smokers. For example, among African-American smokers who called the Cancer Information Service (CIS), Orleans and colleagues (1998) found that the use of counseling plus a guide (*Pathways to Freedom*) tailored to the quitting needs of this population produced a 15% quit rate at a 12-month follow-up compared to an 8.8% quit rate among controls who received the standard CIS quit smoking counseling and guide (*Clearing the Air*). Our quit rate is comparable to Strecher and colleagues' (1994) 25% adjusted quit rate at 4-month follow-up among light to moderate smokers who received tailored smoking cessation materials. Moreover, the 13% quit rate among participants who received provider prompting only is slightly higher than the average 8–10% quit rates observed in other studies that have used physician/health provider prompting (Fiore, 1997).

The effects of the provider prompting intervention with tailored written material remained significant after controlling for various demographic and psychosocial variables. Stage of change was most powerfully related to quitting at follow-up. Contemplators at baseline were eight times more likely to report having quit at follow-up than pre-contemplators. Moreover, when stage of change and intervention groups both were included in the multivariate model, the odds ratio for the tailored print intervention arm was even higher (OR = 6.56). This result suggests that tailored print materials might be especially efficacious for contemplators. However, this interpretation should be viewed cautiously because

we: (1) did not find a stage by intervention interaction, and (2) could not discriminate between contemplation and preparation during the baseline. It is possible that the intervention may have been more effective for participants in preparation than contemplation.

An issue that remains unresolved is what are the precise mechanisms through which the tailored interventions achieved success. For example, while the interventions were aimed at addressing smokers' pros, cons and other barriers, none of these constructs predicted smoking cessation. It is possible that the pros and cons that were used to tailor information may not be germane or salient to this population. In addition, although most participants provided very favorable evaluations of the tailored print communications and counseling calls (e.g., gave useful tips, was personalized, helped overcome roadblocks, etc.), there were no associations between these evaluations and whether smokers succeeded in quitting. It is possible that providing tailored interventions, at least in this study, served as a cue to action, especially among those who felt more confident to quit. Another possibility is that the tailored interventions affected the types of strategies (i.e., processes of change) smokers used to quit. Unfortunately, due to time constraints on the telephone interviews, we did not measure smoking processes of change, and therefore cannot address these issues. As tailored communications are used increasingly, it will be necessary to discern the precise mechanisms and situations that predict their enhanced effectiveness compared to non-tailored communications. As this study suggests, tailored communications may affect other processes than those targeted.

In addition, it is unclear why the addition of telephone counseling did not increase cessation rates above those achieved in the group that received the provider prompting intervention and the tailored materials. In previous studies, telephone counseling has been successful at increasing smoking cessation among non-volunteer smokers (Brit, Curry, McBride, Grothaus, & Louie, 1994; Lando, Hellerstedt, Pirie, & McGovern, 1992), although Prochaska and colleagues (1993) found that telephone counseling did not improve cessation rates above using individualized, tailored and stage-matched guides. One possibility is that one counseling call was not sufficient to increase cessation rates further in this population. As others have shown (Zhu *et al.*, 1996), there may be a dose–response relationship between the number of counseling calls and cessation rates; a higher dose or intensity of counseling may have been required. In addition, the reactions suggest that the calls may not have provided enough specific tips about overcoming roadblocks, or sufficiently boosted confidence among those who continued to smoke. Moreover, one of the general purposes of telephone counseling is to direct smokers to use self-help materials. Perhaps our tailored print materials were sufficiently interesting and attention-grabbing by themselves so that they did not require mediation by a counselor to encourage their use. Alternatively, the counselors may have lacked certain skills or characteristics that would have potentiated the written materials further. If tailoring serves to address specific issues that are salient to smokers, then there is no strong theoretical rationale why telephone counseling should necessarily be more efficacious than well-written, personally relevant tailored materials. Both serve to personalize the information and identify and overcome barriers to cessation.

Smoking is becoming disproportionately a behavior of low-income and low-education persons (Mermelstein, 1998). Thus, as in this study, it is important that investigators focus their attention on these populations. Education was related to cessation, such that those individuals with a lower education were more likely to have quit than were more educated individuals. One possibility for this relationship is that among the less educated individuals, our 5th grade reading level materials may have been particularly well-suited. However, experimentation with very low literacy TPCs may be warranted. For example, efforts are needed to investigate how low literacy populations may benefit from tailored auditory and pictorial materials, perhaps individualized to a person's learning style. Additional areas of investigation remain. Among the questions still to be answered are the optimum number of telephone calls and whether, in combination with tailored print communications, more calls would have produced greater impact. An additional question is how tailored strategies can be combined with pharmacologic adjuncts which appear effective at increasing cessation among African-Americans (Ahluwalia, McNagny & Clark, 1998). We advised all smokers who said they smoked within 30 min of waking to use the nicotine patch and provided a coupon for a free starter kit. However, this was a relatively small part of the intervention.

There are several caveats to keep in mind when interpreting the study results. First, our provider prompting achieved an average 48% compliance rate by the study's end. It is uncertain to what extent the interventions would have been more effective if higher compliance rates had been observed. However, given the realities of a busy public health clinic, our compliance rate is probably quite realistic. Second, approximately one-third of the smokers at study entry were lost to follow-up. While this loss was not disproportionate in relation to any demographic, smoking habit, or psychosocial variables, this finding reflects the difficulty of conducting interventions on low-income, transient African-American populations. Nevertheless, it should be noted that the refusal rate of 3% was extremely low. This extremely low refusal rate suggests that both the evaluation strategies and interventions were acceptable to the population and adds to the external validity of the findings. Furthermore, we found that only 35 out of the 160 participants who completed the follow-up had quit smoking. This small sample precludes conducting more complex, multivariate modeling of smoking processes and limits the power of statistical tests. In addition, our

measure of the pros and especially the cons of smoking had poor internal consistencies. The latter finding is consistent with other studies that show lower internal consistency among con vs. pro scales for smoking using other African-American smokers, (Schorling, 1995; Tessaro *et al.*, 1997) and in mammography screening (Rakowski *et al.*, 1997). Consequently, our use of the pro and con items should be viewed as a preliminary attempt to create a decisional balance scale targeting this population, and future efforts should include more pro and con items to create a more psychometrically sound decisional balance scale for this population. Indeed, efforts are needed to identify relevant barriers to smoking among this population in order to facilitate the development of more internally consistent and relevant measures. Lastly, the present study did not test whether tailored interventions aimed at African-Americans are more effective than non-tailored interventions, since the provider prompting intervention group received no print materials, in keeping with the current usual care practice at the clinic. This avenue of research should be pursued further. Finally, while our findings are most applicable to low-income, low-educated African-American smokers, there was enough variability in the socioeconomic status (e.g., about a third had more than a high school education) of our sample to suggest that these results may generalize to diverse populations of African-American smokers.

Efforts also are underway to examine the cost-effectiveness of the intervention. A very rough analysis of costs indicates a cost of about $12.50 per tailored print communication, including the developmental costs. This per item cost would have been reduced with a higher volume. Nonetheless, these relatively low-intensity interventions were applied in a busy community health center and achieved a respectable 22% overall success rate, which is comparable to more intensive interventions using middle class populations. These results add to the growing body of literature attesting to the power of tailored print communications. In view of the increasingly brief time that providers have for interacting with patients, it is critical that more attention be paid to the development and testing of personalized adjuncts, such as tailored print materials.

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