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The most common theory of smoking cessation postulates that readiness to quit begins with changes in attitudes that move the smoker toward behavioral change and eventual cessation. However, trends in smoking indicate that many who currently smoke are not ready to quit. Hence, strategies that both enhance readiness and focus on quitting are likely to be most effective. We hypothesize that an intervention addressed to motivating behavior change will enhance readiness to change, which will in turn increase the smokers self-efficacy regarding further change. A smoking cessation intervention that combined a self-help booklet and televised segments was developed to address these issues in a population of women smokers with high school or less education. Readiness to quit was measured prior to the intervention, immediately following the intervention, and again at six and 12 months after intervention. The results indicate that the intervention had its effects on readiness to quit, which in turn affected self-efficacy, which further enhanced readiness to quit. These findings indicate that interventions aimed at this group of smokers may need to provide achievable objectives that focus on preparing the smoker to quit as well as promote cessation.

This paper describes a smoking cessation intervention that combined televised modeling of smoking cessation behavior with written materials to provide an accessible and effective smoking cessation intervention. It was designed for female smokers with high school or less education who obtain health information from the media.

In the United States, tobacco use is decreasing more rapidly among men than among women (Muir and Sasco 1990; Pierce et al. 1989). Between 1965 and 1995 the rate of smoking among U.S. women declined by one-third compared with slightly more than 50 percent among men. In the past two decades, the number of women who never smoked has not changed (58% in 1965; 58% in 1995). By comparison, for the same period the percentage of men who never smoked varied from 27 percent...
in 1966 to 45 percent in 1995. Moreover, the ratio of former smokers to smokers among men rose from 37 percent in 1965 to 107 percent in 1994; among women, ex-smokers have never exceeded smokers; the comparable ratios were 24 percent in 1965 and 88 percent in 1993 (Office of Smoking and Health 1999).

Data from the Office of Smoking and Health (1999) indicate that the more formal education a woman receives the less likely she is to become a smoker: In 1995 smokers comprised 40 percent of those between the ages of 25 and 44 who did not finish high school; 34 percent of high school graduates; 24 percent of those with some college; and 14 percent of those who graduated from college. Finally, smoking rates among female high school students have increased from 17.9 in 1991 to 23.6 percent in 1997 (Johnson, Bachman, and O'Malley 1998).

That women are taking-up smoking at younger ages increases their likelihood of developing smoking related diseases (United States Department of Health and Human Services 1994). Between 1960 and 1990 the death rate from lung cancer among women increased by more than 400 percent. By 1987 mortality due to lung cancer surpassed breast cancer as the primary cause of death due to cancer among women (American Cancer Society 1998).

STAGE OF READINESS TO CHANGE AND SELF-EFFICACY

Driven by two widely accepted theories of behavioral change, the Transtheoretical Model of Behavior Change (Prochaska and DiClemente 1982; Prochaska et al. 1993) and social learning theory (Bandura 1986), our intervention focused on two outcomes: increasing readiness to change and cessation. The Transtheoretical Model integrates behavioral change principles from several theories using a temporal dimension. Among its core constructs are stages of change, processes of change, decisional balance, self-efficacy, and temptation (Prochaska and Velicer 1997). The stages of change are as follows: Precontemplation is the stage where smokers have no plans to quit or cut down within six months. In contemplation, the smoker plans to quit within 6 months but has made no preparations. Smokers prepared for action have made specific preparations to quit. Action is defined as an actual quit episode in which the smoker has stopped smoking for at least 48 hours. Maintenance refers to abstinence for at least six months. Relapse occurs when a quit attempt fails or when smoking resumes after a six month period of abstinence. Research using this model has shown that smoking cessation occurs over time and that smokers move through these stages as they quit. The Transtheoretical Model also identifies various processes of behavior change, the salience of which varies according to the individual's readiness to change (Perz, DiClemente, and Carbonari 1996; Prochaska et al. 1988).

Matching intervention content to the smoker's readiness assumes that individuals engage in decision making about adopting new behaviors at each stage of change and that these decisions involve different expectancies and motives, often referred to as "decisional balance" (Velicer et al. 1985). Thus, motivating change requires interventions that include different combinations of cognitive and behavioral processes appropriate to different stages of readiness (Prochaska and DiClemente 1983; Dijkstra et al. 1998).

Self-efficacy is a core construct of the Transtheoretical Model and is positively correlated with stage of change (DiClemente, Prochaska, and Gibertini 1985). Self-efficacy scores tend to be low among precontemplators and much higher as the smoker acts and maintains abstinence. Following social learning theory, individuals with high self-efficacy to stop smoking will be more likely to try to be in preparation than in precontemplation. One implication of integrating self-efficacy into Transtheoretical Model might be that, as interventions increase, self-efficacy stage movement should also increase. Conversely, a tenet of self-efficacy theory is the feedback loop between behavior, cognition, and self-efficacy, in which case, as cognition and behavior become congruent with cessation, a feedback loop increases self-efficacy.

The presumed mechanism underlying the motivational aspects of feedback is dissatisfaction with the discrepancy between one's present state (e.g., an unhealthy smoker at risk) and one's desired state (being in control) (Bandura and Cervone 1983; DiClemente et al. 1991). Interventions focused only on feedback about hypothetical health risks may not provoke feelings of discrepancy and self-dissatis-
Changes in self-efficacy and readiness for smoking cessation

The explicit link between receptivity to the intervention and the anticipated subsequent outcomes is an important Transtheoretical Model assumption (DiClemente et al. 1991; Hollis et al. 1991). The content of the intervention tested here contained advice about behavior appropriate for each stage of readiness to change. Those who reported greatest exposure to the intervention were expected to experience change in their perceived ability to perform tasks appropriate to their stage of readiness to quit, and hence in their self-efficacy. Improved self-efficacy was expected to improve their readiness to change at subsequent measurement points (Bandura 1986; Condieotte and Lichtenstein 1981; DiClemente, Prochaska, and Gibertini 1985; Dijkstra, DeVries, and Bakker 1996; Lichtenstein and Glasgow 1992; Velicer et al. 1995b). Since the exposure measure was based on their reported exposure to the various components of the intervention, we expected that greater exposure would produce more effect.

Methods

Intervention Program

The intervention was conducted in collaboration with the Illinois Division of the American Cancer Society, as part of the Great American Smoke-out, and the local news department of WMAQ-TV, the NBC-owned television channel in Chicago. The program was specifically targeted to women with high school or less education. It encouraged those who were ready to quit to select the date of the Great American Smoke-out as their quit date.

There were three components to the intervention process. First, paid television spots promoted new ideas about cessation to the target population; next, new promotions encouraged registration for the program; and finally, the program was run over 11 days in conjunction with the Great American Smoke-out.

The three paid television commercials, developed to promote the idea of quitting prior to registration, were modeled after the "Taster's Choice" coffee commercials (popular at the time) and were broadcast at various times of the day on five channels in the...
Chicago metropolitan area. The three components were serialized, and the message content encouraged women in the target group to reconsider the reasons why they smoked by relating smoking cessation to their other relevant life-goals. The commercials used the tagline, “It’s Time.”

Promotions for the news segments containing the intervention also using the phrase, “It’s Time,” ran during the registration period on the NBC-affiliated channel. They invited women who smoked to call a toll-free number, staffed by a direct-mail contractor, to receive free information about how to quit as part of the Great American Smoke-out. Callers were screened for eligibility (women with high school or less education who smoked) and, if eligible, were sent a copy of the “It’s Time” motivational booklet prepared by program staff, published by the Illinois Division of the American Cancer Society (Burton 1986), and designed to guide women through different stages of smoking cessation (Prochaska and DiClemente 1983). Ineligible callers were sent another appropriate American Cancer Society smoking cessation booklet. The intervention had two components: the booklet and the televised series.

The nine intervention segments were broadcast on the early evening news and repeated on the early morning news the following day. Five segments led up to the Great American Smoke-out and stressed preparation for quitting. Relevant behavior was modeled by women who agreed to be filmed as they attempted to quit smoking. As they modeled their quitting behavior, they candidly reported their experiences with various behaviors recommended in the booklet. A sixth segment focused on the quit date. The segments on the three days following the smoke-out focused on managing the problems of withdrawal and remaining abstinent. During these segments the models reported their experiences with withdrawal and temptation and how they dealt with each. Women were encouraged to use the booklet as the primary intervention source and to select segments appropriate to where they were in the cessation process. The televised segments roughly followed the booklet but integrated tasks based on all levels of readiness to quit.

The booklet was written for women with high school or less education and designed so the women could readily find the sections relevant to their stage of readiness to quit. Neither the booklet nor the televised segments offered a fixed sequence of steps; both covered topics relevant to each stage of readiness to quit. The booklet content reflected results from focus groups and interviews with potential users. Each section of the booklet begins with the phrase, “It’s time.” There is an introduction that describes how to use the booklet. It encourages readers to begin by reviewing the five sections describing tasks for each stage.

The section for precontemplators begins with the phrase, “It’s time to think about it.” The content is designed to give smokers new ways of thinking about quitting. It contains sections that encourage the smokers to assess their personal traits (e.g., independence, being a good friend, being dependable and caring, and hard working) and helps them link the traits with reasons for thinking about quitting that came from the focus groups. One key theme states that tobacco smoke is dangerous. It describes the scientific basis for that assertion and shows how the smoker can apply it to other relevant issues like family planning or their children’s health.

For contemplators, the theme is, “It’s Time to Get Ready.” It begins by focusing on the woman’s reasons for quitting and begins to create a sense of self-efficacy by showing her how to quit. The text emphasizes efficacy-building themes like “keeping it simple” and “planning ahead” and provides concrete illustrations for each. The section for preparation has the theme, “It’s Time to Get Started.” It deals with setting a quit date and reemphasizes planning for unanticipated cues to smoke. Finally, it calls on the smoker to review again her reasons for quitting. Action is introduced by the phrase, “It’s Time to Do It.” It discusses how to deal with triggers for smoking, withdrawal, and cravings. Finally, maintenance and relapse are introduced with the theme, “It’s Time to Keep At It.” This part of the booklet deals with slips, doubts about being able to maintain abstinence, weight control, and smoking cues and triggers.

Data collection for evaluation

A quasi-experiment (Cook and Campbell 1975) was designed to evaluate the intervention. Since it was not possible to randomize individuals to intervention and control conditions, a population comparison group was ran-
domly selected from the target population and interviewed prior to the beginning of the paid televised segments.

The targeted sample for the population comparison group baseline survey was female smokers with high school or less education living in Chicago area households with telephones. To reduce the number of unproductive calls, a random digit dialed sample of 75,284 telephone numbers, screened to exclude nonresidential and nonworking numbers, was purchased. The baseline survey questions included selected demographic characteristics, current smoking level, smoking history, and motivation to quit for current smokers.

We were able to conduct a screening interview in 87 percent1 of the households in the sample. Of those households screened, only 3.26 percent were eligible (i.e., included a female smoker with high school or less education). From the pool of 1,608 eligible households, 1,514 baseline interviews were completed. Assuming that at least 3.26 percent, or 305, of the households that could not be screened were likely to be eligible, the response rate to the baseline survey is the ratio of 1,514 completed interviews divided by the sum of the 1,608 cases known to be eligible plus 305 presumably eligible cases who were not contacted, for a response rate of 79.14 percent. However, for the resulting panel, only 38 percent had data from all time points.

An analysis of the missing data indicated that attrition was due primarily to cases lost to follow-up because of inability to trace unlisted telephone numbers. An analysis of effects on the dependent variables (Turner et al. in press), demonstrated that attrition was higher among women who were more mobile, younger, single, and had lower incomes than other women in the sample, but attrition was not correlated either with stage of readiness to change or with smoking status at the point of last contact.

For purposes of this analysis we combined the two panels. This decision was driven by our primary study objective, which was to study the relationships among exposure to the intervention, change in stage, and self-efficacy. The data reported by Freels et al. (1999) indicated that we would have a broader range of exposure if the two panels were combined. Thus, we decided to analyze the data as a single panel. However, as can be seen in Table 1, there were statistically significant demographic differences between the registrant and population panels at baseline. The registrants were older, more often nonwhite, less likely to be employed, and, based on their stage of readiness to quit at baseline, tended to be more ready to quit than the population panel. To allow for differences in outcome due to baseline differences, panel membership was a control variable in the analyses. In addition, baseline data on respondent age, race, smoking rate, and stage of change are treated as covariates in the models. In the combined panel, respondent age varied from 18 to 82 (mean = 45.67), and 25.6 percent were not white (coded...
TABLE 1. Descriptive Statistics for Both Panels at Baseline, with Comparison between Population and Registrant Panel

<table>
<thead>
<tr>
<th>Variables</th>
<th>Combined Panels n = 986</th>
<th>Population Panel n = 365</th>
<th>Registrant Panel n = 621</th>
<th>Population vs. Registrant Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean 45.67 SD 4.23</td>
<td>Mean 43.07 SD 14.31</td>
<td>Mean 47.19 SD 13.97</td>
<td>Mean 1.98 t = 4.4***</td>
</tr>
<tr>
<td>Number of cigarettes smoked</td>
<td>21.00 12.79</td>
<td>18.68 9.50</td>
<td>23.37 14.22</td>
<td>2.15 0.69 t = 4.9***</td>
</tr>
<tr>
<td>Race (% White)</td>
<td>74%</td>
<td>80%</td>
<td>71%</td>
<td>1 x² = 9.4*</td>
</tr>
<tr>
<td>Stage of Change</td>
<td>1.91 0.74</td>
<td>1.52 0.66</td>
<td>2.15 0.69</td>
<td>1.984 t = 14.3***</td>
</tr>
<tr>
<td>Employed</td>
<td>2.10 0.89</td>
<td>1.95 0.88</td>
<td>2.19 0.87</td>
<td>1.984 t = 4.1***</td>
</tr>
<tr>
<td>Percent Employed</td>
<td>55.5%</td>
<td>63.5%</td>
<td>50.7%</td>
<td>1 x² = 15.0***</td>
</tr>
</tbody>
</table>

*p ≤ .05 **p ≤ .01 ***p ≤ .001

Note: Of the 986 participants, we had employment status on 981. Of the 365 in the registrant panel, we had employment status on 364. Of the 621 in the population panel, we knew the status of 617. Employment was coded “1” = fully employed; “2” = partially employed, and “3” = unemployed.

dichotomously as white/nonwhite). Respondents smoked an average of 21 cigarettes per day, and the modal baseline stage was contemplation (N = 435).

Measurement

Exposure to the intervention components—television and booklet was assessed at post intervention. Combining the nine televised segments and 16 booklet elements resulted in 25 potential data points. The actual pattern of exposure was not well distributed, and as a result, we created ordinal measures of exposure. The nine televised segments were coded as follows: no exposure = 0; low exposure (viewed 1–3 segments) = 1; medium exposure (4–6 segments) = 2; high exposure (7–9 segments) = 3. Exposure to the 16 booklet elements was coded as follows: no exposure = 0; low exposure (read 1–4 elements) = 1; moderate exposure (5–8 elements) = 2; high exposure (9–12 elements) = 3; very high exposure (13–15 elements) = 4; and complete exposure (all elements) = 5.

Using baseline data we classified respondents into one of six Transtheoretical Model stages of readiness to quit: precontemplation coded as 1, contemplation as 2, preparation as 3, action as 4, maintenance 5, and relapse 6. Stage was reassessed at each subsequent measurement point. These stages appear to be quite stable indicators of change and hence, appropriate intermediate outcome measures (Morera et al. 1998). Some have questioned the utility of readiness to change as an independent variable (Farkas et al. 1996; Farkas 1999). Our work on this project (Morera et al. 1998) indicates that stage has good psychometric properties as a dependent variable, and it is used that way in this paper.

As measured in this project, self-efficacy assesses the individuals’ confidence that they will remain abstinent in a variety of situations that might promote a relapse. Self-efficacy was not measured at baseline since all the respondents were smoking at baseline. We collected self-efficacy data at immediate post intervention, 6 months, and 12 months using a scale in which the respondent was asked how sure she was that she could remain abstinent in nine situations including: drinking tea or coffee, feeling upset or depressed, being in the presence of another smoker, being angry, having a disagreement with some one close, drinking an alcoholic beverage, feeling pressure, working, and being around children. Responses were coded on a scale from 1 to 4, where 1 is “not at all sure” and 4 is “very sure.” Scores on the nine items were summed to create the final scale. The reliability of our measure of self-efficacy, as measured by Cronbach’s alpha (Carmines and Zeller 1979), was .81 at immediate post intervention, .83 at 6 months post-intervention, and .82 at twelve months post-intervention.

ANALYSIS AND RESULTS

Following Dijkstra et al. (1996) and based on social learning theory (Bandura 1986), we hypothesized that the amount of exposure to the two components of the intervention would influence stage of readiness to quit smoking, and as readiness increased, self-efficacy would increase.
For each observation point (immediate post, 6, and 12 months) a one-way analysis of variance was performed with stage of readiness as the independent variable and self-efficacy as the dependent variable. There was a significant main effect at immediate post intervention ($F_{3,982} = 80.50, p < .001$), and Dunn-Sidek (Dunn 1961) post-hoc tests indicated that all pairs of treatment conditions were significantly different ($p < .001$). The means, standard deviations and ranges are shown in Table 2 for all observation points. There were also main effects at six months ($F_{3,982} = 96.87, p < .001$) and at 12 months ($F_{3,982} = 137.73, p < .001$). At each point the Dunn-Sidek tests for pairs of treatment conditions were also statistically significant ($p < .001$). Tables 2–4 show the cross tabulation between self-efficacy—and stage at point of intervention, six and twelve months. These results indicate that as stage or readiness increased, so did self-efficacy and this association was stronger at each subsequent observation point (See Table 2).

Path analytic models (Jöreskog and Sörbom 1996) tested whether exposure to the televised intervention and exposure to the booklet predicted stage of readiness to quit and self-efficacy throughout the intervention follow-up period. In the models presented in Figure 1, arrows indicate parameters that were estimated, and there are coefficients for those parameters that are statistically significant at the .05 level. Prior to assessing the effects of the intervention components on stage of readiness to change and self-efficacy, we assessed the causal relationships between stage of readiness to change and self-efficacy using null models. Two alternative models were used to assess the interrelationships between stage of change and self-efficacy as shown in Table 5. In one null model, “Stage of Readiness Predicts Self-efficacy,” stage of readiness at time $T_N$ was hypothesized to affect change in self-efficacy at time $T_{N+1}$, which in turn predicted change in stage of readiness at time $T_{N+1}$. In this model, we estimated: (1) the effects of baseline race, number of cigarettes smoked per day, age, and stage of readiness to change on stage of readiness to change and self-efficacy at immediate post intervention; (2) the effects of cigarette consumption on self-efficacy at six and 12 months post intervention; and (3) stage of readiness to change at time $T_N$ on stage of readiness to change at $T_{N+1}$; (4) the direct effect of self-efficacy at $T_N$ on subsequent self-efficacy at $T_{N+1}$; and (5) the effects of measures of error on endogenous variables. Serially correlated measures of change and self-efficacy across all time points were estimated, but measurement error between readiness to change and self-efficacy was not estimated.

As shown in Table 5, the measures of model fit were adequate: $\chi^2(26) = 73.37, p < .001$; RMSEA = .043, and AGFI = .96. The $\chi^2$/df ratio, for example, is between 2.0 and 3.0, indicating adequate model fit. The values of the other indices are also in the acceptable range, indicating that this null model adequately describes the data.

In an alternative null model, “Self-efficacy Predicts Stage of Readiness,” self-efficacy is predicted to affect stage of readiness to change, which in turn affects subsequent mea-

### TABLE 2. Cross-tabulations between Self-efficacy and Stage of Readiness to Change over Time

<table>
<thead>
<tr>
<th></th>
<th>Efficacy 1</th>
<th>Efficacy 2</th>
<th>Efficacy 3</th>
<th>Efficacy 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>59</td>
<td>111</td>
<td>87</td>
<td>39</td>
</tr>
<tr>
<td>Contemplation</td>
<td>19</td>
<td>117</td>
<td>228</td>
<td>144</td>
</tr>
<tr>
<td>Preparation</td>
<td>4</td>
<td>14</td>
<td>55</td>
<td>62</td>
</tr>
<tr>
<td>Action (Quit)</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>41</td>
</tr>
</tbody>
</table>

$\chi^2(9) = 225.63, p < .001$

### TABLE 3. Cross-tabulations between Self-efficacy and Stage of Readiness to Change over Time

<table>
<thead>
<tr>
<th></th>
<th>Efficacy 1</th>
<th>Efficacy 2</th>
<th>Efficacy 3</th>
<th>Efficacy 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>84</td>
<td>161</td>
<td>116</td>
<td>53</td>
</tr>
<tr>
<td>Contemplation</td>
<td>27</td>
<td>118</td>
<td>167</td>
<td>87</td>
</tr>
<tr>
<td>Preparation</td>
<td>0</td>
<td>11</td>
<td>43</td>
<td>19</td>
</tr>
<tr>
<td>Action (Quit)</td>
<td>1</td>
<td>2</td>
<td>16</td>
<td>81</td>
</tr>
</tbody>
</table>

$\chi^2(9) = 286.51, p < .001$
FIGURE 1. Intervention Model

Baseline          Immediate Post    6 Months    12 Months

Panel

Race

Age

Number Smoked

Stage of Change

Self-Efficacy

Television Exposure

Booklet Exposure

Note: Squared multiple correlation are presented in italic. All path coefficients are standardized and significant at p < .05.
TABLE 4. Cross-tabulations between Self-efficacy and Stage of Readiness to Change over Time

<table>
<thead>
<tr>
<th>Table 4. Cross-tabulations between Self-efficacy and Stage of Readiness to Change over Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twelve Months Post-intervention Cross-Tabulations</td>
</tr>
<tr>
<td>Efficacy 1</td>
</tr>
<tr>
<td>Precontemplation</td>
</tr>
<tr>
<td>Contemplation</td>
</tr>
<tr>
<td>Preparation</td>
</tr>
<tr>
<td>Action (Quit)</td>
</tr>
</tbody>
</table>

\[ \chi^2(9) = 361.81, p < .001 \]

Note: Measures of self-efficacy could range from 9 to 36. We categorized self-efficacy into four categories: efficacy 1 (scores ranging from 9–15), efficacy 2 (scores ranging from 16–22), efficacy 3 (scores ranging from 23–29) and efficacy 4 (scores ranging from 30–36).

asures of self-efficacy. All other estimated effects are identical to the first null model. Measures of goodness-of-fit used to evaluate this model are \( \chi^2(26) = 200.98, p < .001; \) RMSEA = .083; and AGFI = .90 (See Table 5).

Since the two null models are not nested within one another, we used the fit indices (e.g., the AGFI, RMSEA, and \( \chi^2/\text{df} \) indices) to evaluate them. The null model which predicts stage of readiness from self-efficacy does not provide an adequate fit; the ratio of \( \chi^2 \) to its degrees of freedom exceeds 3.0, which indicates poor fit between data and model. All remaining indices are consistent with poor model fit. We conclude that the null model in which stage of readiness predicts self-efficacy provides the best fit.

Improvement of the model due to the intervention was considered in the intervention model (Figure 1). Since the intervention model is nested within the null model of “Stage of Readiness Predicting Self-efficacy,” we can adopt an alternative models approach (Jöreskog and Sörbom 1996) to assess model improvement. Significant differences in improvement of the fit over the best null model by the intervention model would indicate that the amount of exposure to the intervention affected stage of readiness to change at immediate post-intervention.

As seen in Table 5 the intervention model produced a significant improvement in model fit over the null model (\( \chi^2(4) = 32.06, p < .001 \)). In addition, all other fit indices were improved. Among the baseline measures, non-whites were more ready to change their smoking behavior at the immediate post intervention measurement, as were lighter smokers. Individuals who smoked fewer cigarettes daily at baseline were also more confident of their ability to stop smoking than those who were heavier smokers throughout the twelve-month period. Smokers in later stage of readiness to change at baseline were in later stages of readiness to change at the post intervention measurement point, and these individuals also expressed greater self-efficacy regarding their ability to stop smoking at immediate post-intervention.

The exposure to the intervention also had additional effects beyond baseline characteristics. The amount of exposure to the booklet had a direct and positive effect on both stage-of-readiness-to-change and self-efficacy at immediate post-intervention. The amount of exposure to the televised segments had a direct and positive effect on stage-of-readiness-to-change at immediate post-intervention but not on self-efficacy.

Over the 12 month observation period, smokers in later stage-of-readiness-to-change at \( T_N \) had higher self-efficacy scores at \( T_N \). Stronger self-efficacy at \( T_N \) in turn was associated with greater preparedness to change at time \( T_{N+1} \). Finally, stage-of-readiness-to-change and self-efficacy at \( T_N \) affected subsequent measures of stage-of-readiness-to-change and self-efficacy at \( T_{N+1} \).

There were also indirect and significant

<table>
<thead>
<tr>
<th>TABLE 5. Measures of Goodness-of-Fit for Hypothesized Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Efficacy-affected Null Model</td>
</tr>
<tr>
<td>Stage-affected Null Model</td>
</tr>
<tr>
<td>Intervention Model</td>
</tr>
</tbody>
</table>
intervention effects beyond the immediate post intervention assessment both on self-efficacy and, particularly, stage or readiness. These indirect effects were through the paths of stage to self-efficacy. Although they are not presented in the figure, the standardized indirect effects for booklet exposure ranged from .03 to .07, and the effects for television exposure ranged from .02 to .04.

DISCUSSION

The intent was to address three questions that followed from our hypothesis.

Will smokers who are not ready to quit smoking attend to an intervention and become more ready to quit? About three-quarters of those in the panel were either contemplators or precontemplators at baseline. About 60 percent of those either saw the televised segments, read the booklet, or did both (Freels et al. 1999). The data presented in Figure 1 indicate that exposure to the intervention, particularly exposure to the booklet, directly affected stage at post intervention. After taking into account the effects of baseline stage of readiness and other covariates the booklet intervention coefficient was the strongest predictors of stage at post intervention, and the televised segments were also significant. Moreover, as noted above, there were indirect effects of the intervention through 12 months. Thus, smokers who were not ready to quit at baseline but who attended the intervention were most likely to eventually quit.

Is change in readiness associated with self-efficacy about being able to successfully avoid smoking in situations that cue smoking? The model presented in Figure 1 shows that the path to self-efficacy is through stage. While at any point in the model, stage is the best predictor of stage at any subsequent point in the model, the effects of the intervention on self-efficacy are through stage of readiness which is a behavioral measure. Hence the outcome is consistent with the theory and our model of how the intervention was intended to work.

Will the effects of the intervention persist over time? The model presented in Figure 1 shows that the paths at post intervention persist for 12 months. As we noted above, other analyses have shown the intervention effects did not persist after 12 months. Self-efficacy at baseline predicted stage at 6 months post follow-up which in turn predicted self-efficacy at 6 months. This pattern of association is repeated at 12 months. Thus, the intervention had a direct effect immediately following the intervention on stage of readiness to change, and the booklet on self-efficacy as well. Stage predicts self-efficacy at the subsequent measurement point, and then self-efficacy in turn predicts stage of readiness. The continuing effects of the intervention are statistically significant and persist through the stage variable.

These results need to be interpreted cautiously. Although we controlled for panel membership and for demographics in the analyses reported, there were differences between those who dropped out and those who remained in the study. However, as we noted, attrition was not correlated with the dependent variable.

Nevertheless, these results suggest that smoking cessation programs that address the smoker's readiness to quit and provide achievable goals can be delivered in unintrusive public health formats (Glynn, Boyd, and Grumen 1990). The pattern of response to the intervention described in this paper is somewhat different from that observed in our earlier research (Warnecke et al. 1992). In the earlier studies, the highest point prevalence of cessation occurred immediately following the intervention. However, in the interval between post intervention and 6 months there was a very high rate of recidivism among those who quit. In contrast, in response to the present intervention there was a small post intervention effect that increased during the twelve months post intervention most strongly among those who made most use of the intervention.

This pattern of a gradual increase in smoking cessation among those exposed to the intervention is consistent with our theory that smoking cessation among those not immediately ready to quit is likely to occur over time and in stages. It reflects the reality that many current smokers are not ready to quit even when they register for such programs. Given that many were not prepared to take action, i.e., quit, at the time they registered for the intervention and the stability of stage as a dependent variable (Morera et al. 1998), this pattern was not unexpected. If we accept that change in smoking behavior is a process, these results suggest that interventions aimed at moving smokers toward cessation can be delivered and achieve some stable outcome, even if
the outcome is not immediate cessation. These results are also consistent with the literature regarding the role of self-efficacy in smoking behavior change. They indicate that self-efficacy increases as the individual moves closer to achieving the desired behavioral change.

The approach to smoking cessation via a trusted format—the televised evening news—used televised programming, coupled with written materials obtained by those who register for the program. However, this approach assumes that the smoker will quit at the end of the intervention. Consequently, there is no provision for follow-up intervention. Although we did monitor the smoking status of respondents for 24 months, there is no indication that the follow-up interviews affected smoking status in either panel. Since both panels received the same interview, the effects if any would be likely to affect both panels. However, there were no panel effects in the model after we controlled for exposure to the intervention. These results are consistent with the conclusion that the intervention effects were the only influence on smoking introduced by the study.

On the other hand, the patterns of cessation we found do suggest that follow-up communications might facilitate even greater change and would likely promote earlier response. In fact Manfredi et al. (1999) produced such effects using the written component of the intervention in public health clinics and supplementing it with a telephone interview designed to address barriers. Their results would indicate that public health interventions aimed at inducing smoking cessation may benefit from some form of follow-up to reinforce initially successful outcomes and to assist those trying to quit in overcoming barriers.

Reinforcement of initial behavior change is a major theme of the growing research and clinical interest in smoking cessation interventions that incorporate “stepped-care approaches” (Abrams et al. 1996). The most sophisticated of these strategies involve tailoring, where follow-up cessation communications are based on data obtained directly from smokers about their readiness to change and the barriers and supports for this behavior (Dijkstra et al. 1998; Strecher, Kreuter, and Den Boer 1994; Velicer et al. 1995a). Tailoring depends on collecting information from each individual to whom the intervention is addressed prior to delivering the message. Hence, it may require placing such interventions in some type of organizational context where the host institution can assume responsibility for follow-up communications which would provide tailored feedback to those who participate as they move toward cessation. “Free-and-Clear,” an intervention developed by Group Health of Puget Sound, an HMO, has incorporated this type of intervention into their system (McAfee et al. 1998). The strategy, used effectively by Manfredi et al. (1999), includes a supportive, follow-up telephone call to those who participate. The resulting cessation rates indicate that participants respond well to the telephone portion of the intervention. These results indicate that minimal support following the intervention can effectively move participants toward cessation.

There is some evidence that these supplemental interventions are becoming part of the standard of care for cessation (Curry et al. 1998; Hollis et al. 1991; McAfee et al. 1998; Manfredi et al. 1999). However, general and effective implementation of these strategies in out-patient care settings or in other sites like the workplace is still rare.

NOTES
1. A screening questionnaire could not be administered to the other 13% of the sample elements due to refusals, answering machines, and telephone numbers that were never answered.
2. We rescreened all households to verify the eligibility as defined by the outside vendor. Most of the cases that were deemed ineligible were due to education (i.e., they had more than a high school education).
3. The decision to limit the analysis to twelve months was based on analyses for another paper (Warnecke et al. 2000) which clearly showed that the effects of the intervention are not evident after 12 months.
4. Bollen (1989) describes the consequences on the maximum likelihood estimator for violations on normality assumptions for exogenous variables. When normality assumptions are violated for the exogenous variables, the maximum likelihood estimator has desirable properties (Browne 1982). Moreover, the usual tests for statistical significance can be applied given the violations of multinormality in our exogenous variables if certain assumptions hold.
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