Health Behavior Changes Through Television: The Roles of De Facto and Motivated Selection Processes*

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We assess the role played by two types of self-selection in accounting for the influence of a television series on smoking cessation. De facto selection is based on respondents' regular channel viewing habits that can expose them to the series. Motivated self-selection takes place when viewers deliberately select to watch television programming because it meets their desire to quit smoking. Self-selection can also be viewed as a methodological artifact, spuriously accounting for the association between the airing of the series and smoking cessation among the target audience. Subjects were a probability sample of Chicago smokers who regularly watch the evening news on one of the network channels. The intervention was a televised self-help smoking cessation program broadcast on one of the network channels, over 20 days. Using nested covariance structure models for the analysis, we conclude that 1) de facto selection had no influence on exposure to the program; 2) motivated selection had no influence on exposure to the program; 3) the program reduced smoking; and 4) this effect cannot be attributed solely to the methodological artifact of self-selection, although motivation to quit smoking did have the strongest influence on attempts to quit.

It has proven difficult to design mass media health promotion campaigns that bring about meaningful behavior change in a large proportion of exposed persons. For example, televised smoking cessation clinics typically help only 4 to 5 percent of smokers to quit and stay quit for a year or more, although supplementing these clinics with written materials may double effectiveness (Flay 1987a, 1987b). Media programs have low success rates for many reasons, including not reaching the target audience enough times, not gaining the attention of the target audience even when they are reached, using messages that are not fully comprehensible to the target audience, and using ineffective messages (Flay and Burton 1990). In this study, we assess how two different types of self-selection (Sears and Freedman 1967) might ac-

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count for a television series' influence on smoking cessation.

Sears and Freedman (1967) suggested that self-selection may be de facto or motivated. **De facto** selection depends on respondents' regular channel viewing habits, which will only expose them to a health promotion series if it is broadcast on the channel they prefer. **Motivated** self-selection operates when viewers deliberately select to watch a television program because it meets a specific need—in this study, to stop smoking. Self-selection also can be a methodological artifact, spuriously accounting for an association between the airing of a series and smoking cessation among the target audience.

**De Facto Selectivity**

Earlier experimental social psychological research concluded that **de facto** selectivity is widespread and that individuals acquire much of what they learn as a product of exposures they have not sought out (Freedman and Sears 1965; McGuire 1968, 1985; Sears 1968). This being the case, it is no surprise that some scholars have called for studies of the determinants and consequences of **de facto** selectivity (Cotton 1985; Katz 1968; Klapper 1949, 1960; Sweeney and Gruber 1984; Zillman and Bryant 1985). For instance, women read more health-related stories than men, probably because these particular stories appear more often in magazines read mostly by women for other purposes (Feldman 1966). People not employed full-time and older persons are more likely than others to see almost any program on television simply because they watch more television than younger or employed persons (Real, Anderson, and Harrington 1980; Smith and Moschis 1984). Can changes in health behavior (e.g., smoking cessation) result from incidental exposure to media outlets, especially when there is no prior desire to change? We refer to this as the "**de facto selectivity**" hypothesis (represented by path A in Figure 1).

**Figure 1. Theoretical Model of Selection Processes**

[Diagram of selection processes]

**Selection Processes**

- **De facto selection** = A
- **Motivated behavior change** = D
- **Motivated selection** = C
selection does indeed lead to higher rates of smoking cessation, then campaign effectiveness depends on successful dissemination—reaching the target audience in large numbers—rather than on any strategy that would involve targeting individuals already willing to change. Moreover, in most areas of the country, media professionals know the demographics of the audience usually reached by any particular program. Hence, if one wanted to reach a sub-audience with a particular profile—in our case, city residents who are poor and of color—it would be possible to select media outlets that disproportionately reach them. Reaching large numbers of smokers who do not want to quit nevertheless may cause some of them to quit because of their exposure to televised smoking cessation materials that they had not been particularly motivated to seek out for themselves.

Motivated Selection

The motivated selection hypothesis posulates that people who are motivated to make a particular change will actively seek out programs to help them make that change. Katz (1980) suggests that such selectivity is a major mediator of mass communication effects because it influences both the nature of the content to which someone is exposed and how deeply he or she processes the message. From this perspective, it seems reasonable to hypothesize that people who are more ready (motivated) to stop smoking will be more likely than others to seek out and view a televised smoking cessation program and to process the program content more deeply in ways that add to program effects over and beyond those that might be attributed to motivation alone. We refer to this as the "active motivated selective exposure" hypothesis (represented by path C in Figure 1). As obvious as this hypothesis seems, it has not been corroborated directly. Indeed, earlier experimental social psychological research found little evidence for widespread selective exposure to materials with a particular point of view (Freedman and Sears 1965; McGuire 1968, 1985; Sears 1968), and some scholars have suggested that a lack of motivated selective exposure to media programs is one possible reason for a lack of media effects (e.g., Klapper 1949, 1960; Roberts and Maccoby 1985).

Self-Selection as a Methodological Artifact

A different type of motivational hypothesis suggests that people motivated to change often do so independently of exposure to a televised program on the topic. If program effects are correlated with such motivation, then a self-selection confound can result, with analysts attributing behavior change to the program rather than preexisting motivation. Such a pattern is often viewed as a methodological artifact without substantive value for explaining media effects (Sears and Freedman 1967). We refer to this as the "motivated behavior change" hypothesis (represented by path D in Figure 1). Before any effects can be attributed to a televised program, we must rule out the possibility that any relationship between the program and changes in smoking rates is not due to path D—that is, those people who change happen to be those who would have changed anyway.

Study Hypotheses

This paper presents an empirical assessment of the relative importance of the above conceptualizations of self-selection in determining the effects of a televised smoking cessation program. Literature in communications research and experimental social psychology predicts that exposure to the televised smoking cessation program will be determined more by general media use habits (path A in Figure 1) than by motivation to quit smoking (path C) (Gerber et al. 1986; Snyder and Ickes 1985), especially as the program was promoted only on the channel on which it was delivered. However, we would not expect path C to be insignificant. All rational models of human behavior postulate some form of "active motivational selection" whereby individuals seek out the information they need to pursue goals they have set for themselves—including the goal of quitting smoking. We also expected motivation to quit to predict smoking cessation (path D).

The major intervention hypothesis is that exposure to the television program would influence quitting (path B), indicating that the impact of the televised program was greater than if it had not occurred at all. A significant path B would strongly suggest that motivation to change cannot explain all of the observed ef-


**METHODS**

**The Intervention**

The intervention was a televised self-help smoking cessation program based on the American Lung Association’s “Freedom From Smoking in 20 Days” (see Wamecke et al. 1991 for a detailed description). The program was broadcast during the local evening news at 4 p.m. and 10 p.m. almost every day for three weeks during February, 1987, on Channel 7, WLS-TV, the ABC network-owned station in Chicago.

Smokers could obtain the American Lung Association (ALA) manual that accompanied the televised series directly from participating hardware stores or offices of the participating HMO. Alternatively, they could obtain a manual by first-class mail if they registered at a participating hardware store or (during the final days just before the series started) called an “800” number. During the three-week registration period, 10- and 30-second spots featuring a mime “kicking the habit” were broadcast (only via Channel 7) which told smokers how to register.

The overall project included studies of program participants, examining such issues as the incremental effects of various program components (Wamecke et al. 1991). The analyses reported here are on a panel of smokers drawn for comparative purposes from the general population of smokers within the six-county Chicago Metropolitan Statistical Area (MSA).

**Sampling and Data Collection**

The sample was selected using random digit dialing procedures. Approximately 29,000 households were screened for smoking status and news viewing. For each household, all smokers were listed, and one smoker was randomly selected for an interview. Those smokers who did not view news on television (approximately 13%) were not followed. Viewers of Channel 7 news were oversampled. The final panel was composed of roughly equal numbers of viewers from the target and non-target channels (resulting sample weights of 1.16 and .80, respectively). From the screening, 3,299 eligible respondents were identified and 2,398 were interviewed (Time 1 [T1]). About 85 percent of these were reinterviewed at the second pretest (Time 2 [T2]) and 1,560 (65%) were reinterviewed at the immediate posttest (Time 3 [T3]). The primary reason for attrition was failure to reach the respondent because of unlisted numbers when the respondent moved (Warnecke et al. 1992). Of the 1,560 respondents available at the second posttest (Time 4 [T4]), 200 were excluded because they had quit smoking by T2 and thus were not asked about their plans to stop smoking. In addition, 102 cases were deleted because of missing income data, 22 cases because of missing responses on indicators of motivation to stop smoking, and 28 cases because of missing values on one of the other model variables.
Table 1 indicates the characteristics of the sample at T1 and T3 (end of the program), and the composition of the analysis sample. According to Table 1, while attrition was higher among males, among the young, the less educated, and those with lower incomes, these differences were minor.

**TABLE 1. Characteristics of the Analysis Sample and the Complete Samples at T1 and T3**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>T1 Sample (%)</th>
<th>T3 Sample (%)</th>
<th>Analysis Sample (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than High School</td>
<td>13.1</td>
<td>11.5</td>
<td>11.0</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>36.0</td>
<td>35.3</td>
<td>36.4</td>
</tr>
<tr>
<td>College Plus</td>
<td>50.9</td>
<td>53.2</td>
<td>52.6</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than or equal to $13,000</td>
<td>14.7</td>
<td>12.8</td>
<td>12.1</td>
</tr>
<tr>
<td>$13,001-$25,000</td>
<td>23.8</td>
<td>23.1</td>
<td>24.5</td>
</tr>
<tr>
<td>$25,001-$40,000</td>
<td>31.1</td>
<td>31.7</td>
<td>32.1</td>
</tr>
<tr>
<td>More than $40,000</td>
<td>30.4</td>
<td>32.4</td>
<td>31.3</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>56.7</td>
<td>56.2</td>
<td>57.4</td>
</tr>
<tr>
<td>Part-time</td>
<td>13.4</td>
<td>14.5</td>
<td>13.7</td>
</tr>
<tr>
<td>Not Employed</td>
<td>30.0</td>
<td>29.4</td>
<td>28.9</td>
</tr>
<tr>
<td><strong>Race (Black)</strong></td>
<td>16.9</td>
<td>16.0</td>
<td>15.6</td>
</tr>
<tr>
<td><strong>Gender (Female)</strong></td>
<td>55.3</td>
<td>56.8</td>
<td>58.3</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-30</td>
<td>28.2</td>
<td>26.7</td>
<td>26.1</td>
</tr>
<tr>
<td>31-45</td>
<td>35.4</td>
<td>35.3</td>
<td>36.4</td>
</tr>
<tr>
<td>46-64</td>
<td>27.7</td>
<td>29.5</td>
<td>29.6</td>
</tr>
<tr>
<td>65 and above</td>
<td>8.7</td>
<td>8.5</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Frequency of Viewing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 p.m. Channel 7 News</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Days per week)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 days</td>
<td>43.3</td>
<td>43.7</td>
<td>44.0</td>
</tr>
<tr>
<td>1-2 days</td>
<td>17.6</td>
<td>18.7</td>
<td>18.4</td>
</tr>
<tr>
<td>3-4 days</td>
<td>18.2</td>
<td>17.2</td>
<td>17.6</td>
</tr>
<tr>
<td>5-7 days</td>
<td>20.9</td>
<td>20.3</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>Watch Any Intervention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26.1</td>
<td>27.6</td>
<td></td>
</tr>
<tr>
<td><strong>Smoking Status at T2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not smoking</td>
<td>12.0</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td><strong>If smoking, number of cigarettes smoked daily</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20</td>
<td>N/A</td>
<td>42.0</td>
<td>41.6</td>
</tr>
<tr>
<td>20-29</td>
<td>N/A</td>
<td>35.8</td>
<td>36.0</td>
</tr>
<tr>
<td>30-39</td>
<td>N/A</td>
<td>11.7</td>
<td>11.8</td>
</tr>
<tr>
<td>40 or more</td>
<td>N/A</td>
<td>10.4</td>
<td>10.8</td>
</tr>
<tr>
<td><strong>Motivation (Plan to Quit)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>N/A</td>
<td>9.8</td>
<td>10.9</td>
</tr>
<tr>
<td>In more than 12 months</td>
<td>47.2</td>
<td>40.0</td>
<td></td>
</tr>
<tr>
<td>Within 12 months</td>
<td>12.1</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td>Within 6 months</td>
<td>12.8</td>
<td>15.2</td>
<td></td>
</tr>
<tr>
<td>Within 3 months</td>
<td>18.1</td>
<td>19.4</td>
<td></td>
</tr>
<tr>
<td><strong>Stop Smoking 24 hours</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>45.3</td>
<td>38.7</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Number of subjects varies because of missing items: T1, n = 2,201-2,398; T3, n = 1,444-1,560;
- Analysis Sample, n = 1,208.

Approximately one-half of the respondents had education beyond high school, with more than one-half having family incomes greater than $25,000. Employed persons represented more than 70 percent of respondents. The sample had a substantial representation of Blacks (approximately 16%) and of lower income persons. The representation of males and older persons (over 65 years) of age was somewhat lower than their representation in the Chicago MSA, reflecting lower participation by males and lower rates of smoking by the elderly. Slightly less than 60 percent of the sample reported watching the news at 10 p.m. on Channel 7 in the week before the interview. The 10 p.m. news is the most popular time for local news viewing in Chicago. Approximately 20 percent of the sample watched Channel 7 news regularly (five to seven days in that week). Over 25 percent saw at least one segment of the intervention. Twelve percent of the respondents reported not smoking at the second pretest. Of those reporting smoking in this interview, approximately 40 percent smoked less than a pack a day (assuming 20 cigarettes in the average package), and 10 percent smoked more than two packs. This pattern of smoking is similar to that found in the National Health Interview Survey (Novotny et al. 1989), but lower than reported by participants in the smoking cessation program (Warnecke et al. 1991). Almost 20 percent of the smokers planned to quit smoking within three months of the T2 interview. About 40 percent reported having quit for 24 hours during or after the intervention.

**Measurement Model**

We classified the variables used in the model as representing sociodemographic and control variables, news viewing on the target channel, motivation to quit smoking, watching the intervention, and attempts to change behavior (represented by stopping smoking for 24 hours).

**Sociodemographic and Control Variables.** These variables include education, gender, race/ethnic background (Black vs. other), and employment status (full-time, part-time, and not employed). In addition, we controlled for the average number of cigarettes smoked per day, measured at T2.

**News Viewing.** The frequency of Channel 7
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news viewing was assessed by two indicators: the number of times Channel 7 news was watched during the previous week at 4 p.m. and at 10 p.m. These indicators were measured at T2.

Motivation. The motivation to quit smoking was assessed by subjects' reports of plans to quit smoking. Those subjects who had plans to quit were asked when they planned to stop smoking. Responses were precoded to include: in more than 12 months, in less than 12 months, in less than six months, or in less than three months. Those with no plans to quit were coded "never."

Watched Intervention. Subjects were asked post-intervention whether they watched the "Freedom From Smoking in 20 Days" TV programs and the number of days per week they had watched. The measure of exposure used in these models was whether the subject had watched any of the programs.

Behavioral Outcome. The outcome examined was whether the individual stopped smoking for at least 24 hours following the intervention. This measure includes respondents abstinent at T3 (8.9%) and those who stopped smoking for at least 24 hours between the end of the program and T3 (29.8%).

Plan of Analysis

We used covariance structural analysis in this paper. Since most of the observed variables were ordinal, or categorical, we used version 1.20 of PRELIS (Jöreskog and Sörbom 1988b) to compute the polychoric/polyserial correlations between all pairs of variables in the models. Maximum likelihood estimates of the models were obtained with version 7.20 of LISREL (Jöreskog and Sörbom 1988a).

Although driven by theory, fitting structural models proceeds iteratively. One specifies and estimates a model, examines the results and modifies it, adding or removing parameters or constraints to improve the fit to one's sample of data. Such specification searches can produce invalid and unstable models that must be viewed with caution (MacCallum 1986). To protect against sample-specific errors, we adopted a cross-replication scheme. We randomly divided our cases into a development sample on which to explore the data and refine our initial model specification, and a test sample on which to re-estimate parameters using the same model specifications. We required the ratio of the parameter to its standard error to exceed 1.96 in magnitude in both subsamples for replication. When the replication criterion was not met, we nonetheless examined patterns in the parameters. In the majority of cases in which parameters did not meet cross-validation criteria, the specific parameters were in the same direction but statistically significant in only one of the subsamples. Results are presented for the total sample, and the development and test samples separately. Parameters that meet the cross-validation criteria are indicated.

The general model estimated is shown in Figure 1. For simplicity, we omit details of the measurement model and of the error structure. Also, we do not show the paths from the sociodemographic variables to the endogenous variables. The path labelled A summarizes the effect of Channel 7 news viewing on watching the intervention. Path B is the effect of watching the intervention on stopping smoking. The effects of motivation are represented by paths D, the direct effect of motivation on stopping smoking, and C, the effect of motivation on watching the intervention program.

RESULTS

Analysis Strategy

Models representing different aspects of selection were estimated and compared. Table 2 summarizes the fit of five nested models and the final selected model. One model is nested within a second when its free parameters are a subset of those in the second model. Each of the first five models are successively nested. The selected model represents a minor variation that simplifies the structure of the model by constraining one of the paths identified as nonsignificant. This final model is not nested within its preceding model.

In nested models, the effects of adding successive sets of parameters can be assessed via the increment in chi-square. The sequence in which parameters or sets of parameters are added and assessed is theoretically ordered. In Model 1, the sociodemographic variables and level of smoking influence media habits, motivation, program exposure, and attempts to quit smoking. This model serves as our baseline for compari-
### TABLE 2. Goodness of Fit for Nested Structural Models of Selection Process

<table>
<thead>
<tr>
<th>Description of Model</th>
<th>Chi-square (df)</th>
<th>Goodness of Fit Index</th>
<th>Adjusted Goodness of Fit Index</th>
<th>Incremental Chi-square (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: Demographics Only</td>
<td>395.53 (22)</td>
<td>.95</td>
<td>.84</td>
<td></td>
</tr>
<tr>
<td>Model 2: Add Motivation to Quit Smoking Paths from Figure 1: D</td>
<td>320.46 (21)</td>
<td>.96</td>
<td>.86</td>
<td>75.07*** (1)</td>
</tr>
<tr>
<td>Model 3: Add Motivation to Watch Intervention Paths: D, C</td>
<td>320.34 (20)</td>
<td>.96</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td>Model 4: Add Watch Intervention to Quit Smoking Paths: D, C, B</td>
<td>312.75 (19)</td>
<td>.96</td>
<td>.85</td>
<td>7.59** (1)</td>
</tr>
<tr>
<td>Model 5: Add News Viewing to Watch Intervention Paths: D, C, B, A</td>
<td>112.70 (18)</td>
<td>.98</td>
<td>.94</td>
<td>200.05*** (1)</td>
</tr>
<tr>
<td>Model 6 (not nested): Trims Model Constraints Deletes Motivation to Watch Intervention Paths: D, B, A</td>
<td>107.64 (19)</td>
<td>.98</td>
<td>.94</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Probability for incremental chi-square: ** p < .01; *** p < .001.

The goodness of fit index is a minimal defensible model as discussed by Sobel and Bohrnstedt (1985). The specifically hypothesized paths from the socio-demographic variables to endogenous variables are shown in Table 3. Model 2 retains the effects of the socio-demographic variables as in Model 1, but adds path D, representing the direct effect of motivation on attempts to quit smoking. Model 3 adds a path from motivation to watching the intervention. It corresponds to the effect of motivated selection. Model 4 adds the path from watching the intervention to stopping smoking. It tests the effects of the program on behavior. Model 5 adds a path from Channel 7 news viewing to watching the intervention. This is a test of de facto selection effects. Model 6 makes a minor modification by trimming an unsubstantiated relationship.

A comparison of Models 1 and 2 supports the importance of motivation in behavior change. However, the relationship between motivation and watching the intervention was nonsignificant, as shown in the comparison of Models 2 and 3. Thus, the role of motivated selection was not supported. The addition of the path from watching the intervention to stopping smoking made a significant contribution, providing some support for the importance of program exposure for short-term behavioral change. The comparison of Models 4 and 5 shows strong support for the importance of de facto selection.

Since the component of motivated selection did not contribute to the overall model, we set that parameter to zero and estimated Model 6 for detailed presentation. While Model 6 is not nested within Model 5, its goodness of fit residual chi-square was equivalent to that of Model 5 (107.64 with 19 degrees of freedom [p < .001]). The Goodness of Fit Index (GFI) was .98 and the adjusted GFI was .95. We also present the fit of the model estimated on identical models estimated on the development and test samples. The development sample had a chi-square of 68.05, with 19 degrees of freedom (p < .001). Its GFI was .98, with adjusted index of fit of .94. The chi-square on the test sample was 77.92, with 19 degrees of freedom (p < .001), a GFI of .98, and adjusted index of fit of .92. The fit of Model 6 is satisfactory.

Table 3 presents parameter estimates and standard errors for Model 6. The results are summarized for the total sample, and the development and test samples. Paths that met cross-validation criteria are indicated. Figure 2 shows the parameter estimates for the major theoretical paths from Figure 1.


## TABLE 3: Unstandardized Parameter Estimates and Standard Errors for Selection Model

### Predicting Regular Viewing Habits

News viewing on Channel 7 was higher among the employed. A number of other relationships were significant in the total sample, but failed to replicate in the cross-validation. Within the total sample, Blacks and individuals with less education watched the news more frequently on Channel 7, but this was not replicated in the development sample. There were no relationships with age and gender.

### Predicting Motivation to Quit

Motivation to quit was higher among younger smokers and those who smoked fewer cigarettes per day. Blacks reponed higher motivation in the total sample but this relationship was not statistically significant in either of the subsamples. Blacks generally smoked fewer cigarettes than Whites, although their smoking was more concentrated in brands with high tar and nicotine (Novotny et al. 1989). Relationships between education and motivation were not observed.

### Predicting Exposure to the Intervention

In both samples, the frequency with which persons regularly watched the Channel 7 news was the primary determinant of having watched any of the smoking cessation intervention. This supports the de facto selection hypotheses. Both samples also showed that older respondents watched the intervention more often than others. In the total sample, women in general and people with more education were more likely to watch the intervention, but these relationships were not replicated across the samples. No relationship was observed with employment status.
Predicting Attempts to Quit Smoking

Motivation to quit and its determinants were the strongest predictors of attempts to stop smoking. Males, those who were more motivated to quit smoking, and light smokers were more likely to stop smoking for at least 24 hours following the intervention or to be abstinent. For example, those Channel 7 news viewing smokers who planned to quit within three months (the most highly motivated) were twice as likely (12.6%) as those who planned to quit within a year (6.5%) to report trying to quit with the program; these people were in turn twice as likely to try to quit with the program as those who did not plan to quit within a year (3.2%).

DISCUSSION

Our suggested model of the role of self-selection was partially supported. We obtained clear support for the view that de facto self-selection influences whether audiences view particular media programs, and that this viewing then influences behavior change. We found no support, however, for one of the subsamples. Since the 95 percent confidence intervals for parameters in the two subsamples overlap, there is some evidence of a small effect of watching the program and quitting smoking over the short term. Note that this effect is produced in a model which includes the motivation to quit smoking and various demographic factors. These serve as part of the model that takes statistical account of selection as a methodological artifact. Our conclusion about a small treatment effect is of course contingent on its adequacy as an appropriate model of self-selection and behavior change.
the motivated selectivity hypothesis in this sample. Smokers do not seem to have switched channels to watch the cessation program in the form in which it was promoted in this study.

Consistent with part of the de facto selectivity hypothesis was the fact that habitual Channel 7 viewing was the best predictor of exposure to the smoking cessation program (see path A in Figure 1). The fact that exposure to the programming increased 24-hour quitting after a variety of motivational and demographic factors were taken into account also was consistent with the second part of the hypothesis. Taken together, these paths suggest that particular audiences can be successfully targeted and some change brought about merely by determining which group views a particular television channel most often and knowing that the televised content meets high substantive standards. In this case, the effort was directed at a wide audience in the Chicago area, but special emphasis was placed on poor families and African-Americans whose smoking rates are particularly high and whose attendance at smoking cessation clinics is sporadic. Broadcasting the intervention on a channel known to attract households with such a profile did indeed gain an audience that was disproportionately poor and of color. Yet all of this was accomplished within a framework in which literally hundreds of thousands of persons were exposed to the televised smoking cessation materials.

Consistent with the motivated behavior change (and methodological self-selection) hypothesis, the strongest predictor of attempting to quit was prior motivation to quit. But the motivated selectivity hypothesis was not supported in so far as motivation to quit did not predict viewing of the smoking cessation program. Prior motivation to quit does not seem to have been very successful in getting smokers who wanted to quit to switch over from one channel to another. To the extent that loyal viewers on another channel were informed about programs airing on Channel 7, channel loyalties overcame any desire to be exposed to anti-smoking programming. Channel 7 did advertise its smoking cessation program in the press and its own programming, but it obviously did not try to buy time on a competitor’s channel to advertise there!

These findings confirm the observations of many others regarding the difficulties of using mass media for health promotion (Flay et al. 1988; McGuire 1986). On the one hand, those most likely to view the program normally view the channel at the time of the program. These people are not likely to be especially motivated to change. On the other hand, those people most likely to change are already most motivated to change. Since those most likely to change are not motivated to seek out health promotion programs on media channels they do not usually use—at least not with the levels of advertising of the intervention used in this study—the media programming has limited success with them.

Fortunately, our other findings suggest ways around this dilemma. First, viewing the program was a significant predictor of quitting smoking for the complete sample, and in each subsample the coefficients had the same sign and overlapping confidence intervals. The implication is that de facto selection will facilitate quitting because it gets some people to view who are influenced by what they see even if they were not originally motivated to change their behavior. This finding is consistent with the suggestion by Klapper (1960) and Cotton (1985) that de facto selectivity might play an important role in explaining media effects.

At a much more speculative level, an alternative view of motivated selectivity would argue that readiness for change is more passive than going out of one’s way to discover relevant media materials that will support a particular change. Persons "some-what" motivated to change their behavior may discover a program that will help them make the desired change, even though their motivation to change is not strong enough to seek out the program. Two health behavior/promotion theories adopt this view, positing that a program can become a “cue to action” (the Health Belief Model; Becker 1974) or an “enabling factor” (the PRECEDE model; Green et al. 1980), especially for those who are not opposed to change or completely indifferent to it. Some communications researchers also hold this view, considering that self-selection is attributable more to situational than motivational factors (Comstock 1986; Cotton 1985). From this perspective, people who are ready to change might not overtly seek out supportive information, but might instead stumble upon it when they do, attend to it and then participate in program-sponsored activities if it is conve-
nient to do so. They may not actively search for a program, however, or switch from their favorite channel to another. We refer to this as the "cued motivated selective exposure" hypothesis. The data from this study do not allow for a test of this hypothesis because another measure of motivation to change would need to be collected after the initial viewing on the target channel.

An effective extended public health intervention must reach the greater numbers of less motivated smokers among the target audience. Our data demonstrate quite clearly that media programming of this type reaches many people not already motivated to change. Of those Channel 7 news viewing smokers more motivated to quit (that is, planning to quit within three months; n = 86), 45 percent (n = 39) saw the program; of those, 61 percent (n = 24) stopped smoking for at least 24 hours following the intervention. Of those Channel 7 news viewing smokers less motivated to quit (n = 368), the same proportion (45%, n = 165) saw the program and a lower proportion (35%) but higher numbers (n = 59) of them stopped smoking for 24 hours. That is, more than twice as many less motivated as more motivated smokers quit smoking with this program. Though people motivated to change may be more likely to register for a program, view it, and attempt to quit with it, greater numbers of less motivated people can still be reached because of de facto selection.

Further studies are needed to disentangle the extent to which these observed patterns are due to direct effects of motivation to quit on actual quitting behavior (the methodological artifact in this context) or indirect effects of motivation through program participation (cuing). Regardless of the causal paths involved, future program developers might do more to motivate the less motivated members of the target audience to change before presenting them with a program designed to effect that change.

Summary

Exposure to a mass media health behavior intervention is largely determined by de facto selection—by habitual patterns of media use related to the general level of television viewing, channel loyalties, and program preferences. In turn, de facto selection is determined mostly by demographic variables, although some psychosocial and personality variables are likely to be influential (Kviz et al. 1991). Active motivated selectivity appears to play only a minor role in determining exposure: in this instance, few persons switched channels to view the offered program. More might have done so had there been even more publicity about the smoking cessation program in outlets read by people motivated to change. But with the level of publicity achieved here, there is no evidence of systematically changing channels to be exposed to the televised smoking cessation materials. Future research needs to examine the role of cued motivated selective exposure to test whether exposure causes an increase in the motivation to quit in at least some kinds of people.

The findings that 1) channel preference predicted exposure and 2) exposure predicted quitting after controlling for some selection factors, suggest that this media program caused a reduction in smoking that would not have occurred during the same time period without the program. In the future, researchers will need to differentiate between different types of selection processes. They also will need to determine the portion of their observed effects due to the motivation to change considered by methodologists to be spurious, and the various sources of selection (de facto, active motivational, and cued motivational) that can legitimately be considered to be the causes of any changes produced by a media program. Examining these issues will require collecting motivational data on all study participants prior to an intervention and at a later time after initial exposure but before multiple exposures and behavior change.

NOTES

1. The purpose of the panel in the larger study was to permit comparisons between program registrants and non-registrants.
2. Sociodemographic information was collected on a subsample of 500 smokers who do not watch the local television news. Persons who were older, female, Black, and had family incomes above $13,000 were more likely than others to watch local television news at least three times per week.
3. Additional interviews were conducted six months, one year, and two years following the intervention. The data reported in this paper are limited to the two pretests (T1 and T2) and the immediate posttest (T3).
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4. Attrition can produce selection bias that could distort estimates of relationships among the variables. We performed logistic regression analyses to predict attrition at the second and third interviews from demographic variables and television news viewing at the time of the initial pretest (T1). Attrition was higher among younger and lower income adults and males. Attrition was not related to baseline smoking level. We conducted some analyses to assess the effects of attrition bias on exposure to the intervention or on attempts to quit smoking. We constructed a bias correction term using the results of our logistic regression models for attrition. The correction term is a variable with a value for each case equal to the density of the logistic distribution divided by the cumulative density at the predicted logit value for attrition for the case. This bias term is used in the same way as the Heckman estimator except that it is based on a logistic rather than a probit model (Heckman 1979). Under certain conditions, this factor can be used to test and correct for selection bias due to systematic attrition. We regressed the correction term on post-intervention and wave 2 variables, controlling for all model variables from T1. The bias correction term did not have a significant relationship with any of the wave 2 (motivation measures) or wave 3 outcomes (attempt to quit smoking).

5. Alternative models using an indicator of how frequently the respondent had watched the intervention (not at all, less than once a week, once a week, 2–6 days per week, and daily) obtained the same pattern of results.

6. The approach was similar to that used in research by Jersey Liang which was described in a series of papers (e.g., Liang et al. 1987). Because dividing the sample in half reduces its size, this approach would not always be appropriate. Considerations would include how small the resultant halves would be and the strength of anticipated relationships. Studies focusing on the measurement model can frequently anticipate stronger relationships than those focusing on the structural model (as this one). A large sample will permit the identification of a larger number of small effects, which may not be of practical importance. A sample size of 600 is not generally regarded as small, and should permit identification of large to moderate relationships. This study can thus serve as an application of this approach to analyses focusing on structural relationships.

Alternative approaches are sample reuse methods like bootstrapping or the jackknife method. Although these approaches may be the best ways of dealing with the stability of estimates, they are in early stages of development for complex models such as covariance structure. models. The situation we face here would be the estimation of model parameters to obtain measures of variability. Efron (1987) suggests 100 or more replications to estimate standard errors of a parameter. Bollen and Stine (1990) point out that this is computationally demanding in LISREL or similar programs. They suggest reducing computational effort by using previous values as start values and limiting calculations to a single iteration. However, our problem also would involve 100 or more sets of iterative calculations to produce the matrix of polyserial/polychoric correlations.

7. In general, the specification searches took the following directions: a) attempts to model the stability of media use, including experimentation with induced variables to represent media use, b) deletion of indicators concerning the helpfulness of a self-help manual and of televised smoking cessation programs in quitting smoking, c) deletion of a poorly distributed indicator measuring obtaining the ALA manual, and d) minor modification based on modification indices. Based on the modification indices, we permitted a correlation between measures of news viewing at 10 p.m. between the T1 and T2 waves. We subsequently simplified the model to use only indicators from the T2 wave. The most successful thrust of the specification searches, in that it resulted in more stable models, was in model simplification. As noted, we dropped indicators of news viewing from the first pretest. We also eliminated income from the model to reduce collinearity with race and education, and we deleted household size. Household size was originally influential when news viewing was divided into early viewing and late viewing constructs, but had no association with a combined news viewing construct. Larger households were less likely to watch the early news, probably because of meal preparation and employment responsibilities. Finally, we conducted a search for multivariate outliers as described by Bollen (1989). This search identified as potentially problematic those respondents with unusual combinations of variables: for example, an 80-year old respondent who smoked three to four cigarettes per day.

8. We investigated the gravity of failure to replicate in the cross-validation process by calculating 95 percent confidence intervals around the parameters in the test and development samples. With two exceptions, the confidence intervals overlapped.

9. Parameters for the measurement model are available from the authors.
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