

## The Effects of a Multiple Treatment Program and Maintenance Procedures on Smoking Cessation

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This study evaluated the efficacy of a multiple treatment smoking cessation program and three maintenance strategies. Phase I of the study involved 51 subjects who participated in a 5-day smoking cessation project. The program consisted of lectures, demonstrations, practice exercises, aversive smoking, and the teaching of self-control procedures. In Phase II, all subjects were randomly assigned to one of three maintenance conditions: a 4-week support group which offered an opportunity to discuss feelings and thoughts, a 4-week telephone contact system which enabled group members to call one another, and a no-contact control group. To evaluate efficacy, extensive follow-up data were collected at the end of treatment and at 2, 4, 6, and 12 months post-treatment. The treatment program was extremely effective; 100% of the subjects were abstinent at the end of treatment, and at 1 year post-treatment, 63% of the subjects reported total abstinence. As to sex differences, at the 1-year period 66% of the women and 59% of the men were ex-smokers. Recidivists reported a smoking rate that was 52% of baseline at the 6-month follow-up. At 2 months post-treatment, 40% of the abstainers reported that the quitting experience was easy, and subjects reported an average weight gain of only 4.69 lb. The authors offer suggestions for future smoking cessation research based upon the promising findings of this study.

### INTRODUCTION

There has been a plethora of smoking cessation studies in the past 15 years. Unfortunately, a review of the smoking cessation literature is uniformly disappointing. Major reviews have estimated the quit rate in smoking behavior modification programs to be about 20-25% one year following treatment (1, 21, 28). McFall and Hammen (25) in a review of major studies noted that, if total samples including dropouts are considered, abstinence ranged between 7 and 40% with a mean of 26% at the end of treatment, and between 9 and 17% with a mean of 13% at follow-up. Hunt, Barnett, and Branch (16) found the 75% recidivism rate for smoking to be similar to that for heroin and alcohol addiction.

A variety of behavior modification techniques have been employed in the treatment of smoking behavior, many with a limited degree of success. One extensively used set of techniques is aversive methods which include electric shock (30, 31), excessive cigarette smoke (11, 18, 22, 23, 32), and covert sensitization (3, 20, 34, 39).

Another set of techniques used extensively in the smoking cessation literature is

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various self-control strategies. These techniques include stimulus control methods (15, 23), contingency contracting (10, 15, 20), and cognitive control (4).

The smoking cessation strategies discussed above have shown varying degrees of short-term success, but minimal long-term success. Lichtenstein and Danaher (21) have suggested that such techniques may be more useful if used in combination. Multiple treatment programs have been employed by a variety of researchers (5, 6, 18, 19).

The vast majority of smoking cessation literature is characterized by effective short-term treatment programs with a dearth of procedures employed to maintain initial smoking abstinence. Therefore, short-term success rates are usually quite high while follow-up data are often disappointing. Tongas (36, 37) suggests that the failure has been in the development of an effective technology for the long-term maintenance of nonsmoking behavior. Group support systems in smoking cessation programs have been suggested as one alternative to this problem (4, 12, 19, 36, 38). The initial data have suggested that support groups represent a viable procedure for helping smokers to remain abstinent.

The purpose of the present study was to present data on the effectiveness of a multiple treatment program and the usefulness of two maintenance procedures in maintaining abstinence. Specifically, the effectiveness of a 5-day smoking cessation program was evaluated immediately following treatment, and at 2, 4, 6, and 12 months post-treatment. The effectiveness of two maintenance strategies, support group meetings and a telephone contact system, were compared with a no-contact control group. It was predicated that the control group would show a greater relapse rate at 12 months than the groups receiving the other two maintenance strategies.

## METHODS

### *Subjects*

Fifty-three subjects were recruited as follows: forty-five participants learned about the project from either newspaper announcements, billboard posters, or word of mouth; eight subjects were notified of the project by telephone because they had participated in a Washtenaw County Health Study and had identified themselves as smokers who would like to quit. Data for two subjects were discarded as scheduling conflicts caused incomplete training.

Twenty-nine subjects were women and twenty-two were men. Subjects ranged in age from 18 to 62 years with a mean of 36 years of age. Daily smoking rate ranged from 8 to 60 cigarettes with a mean of 29 cigarettes per day. The number of years subjects smoked ranged from 2 to 43 years with a mean of 17.5 years. Subjects had made an average of five previous attempts to quit smoking.

### *Procedure*

Three instruments were developed for use prior to treatment, immediately following the 5-day treatment program, and at the follow-ups.<sup>3</sup> The pretreatment

<sup>3</sup> These instruments are available upon request from the senior author.

questionnaire assessed subjects' smoking rate, the number of years they had been smoking, presence of health problems, and weight. On the post-treatment and follow-up questionnaires, these items were again assessed, as well as subjects' subjective ratings of comfort as a nonsmoker, urges for cigarettes, ability to control these urges, difficulty experienced in quitting, and overall degree of satisfaction with the program.

All subjects were required to attend an introductory meeting and four consecutive treatment meetings that were held one week later. Meetings lasted approximately 1½ hr. All 51 participants were involved in the treatment phase as a group. At the end of the treatment phase, subjects were randomly assigned to one of three maintenance conditions. Each maintenance group thus contained 17 subjects. Deviations from random assignment were made in relation to the subject's availability for a specific maintenance procedure and, when possible, to separate family and friends. At the end of 2 months, subjects completed a mail-in follow-up questionnaire. At 4, 6, and 12 months post-treatment, subjects were sent a follow-up questionnaire to be returned within 3 weeks. If it was not returned, they were contacted by telephone.

Before the introductory meeting, subjects filled out the pretreatment questionnaire. At the meeting, the senior author, who served as the experimenter, provided a description of the program. Subjects were asked to pay a \$25.00 non-returnable fee and were told they would be required to pay an additional \$30.00 deposit that would be returned to them in full when they completed and returned follow-up forms.

Participants were given an introductory booklet, the "Quitter's Countdown," which describes a series of homework assignments to be carried out for the 5 days prior to treatment. Assignments consisted of baseline procedures to develop an awareness of smoking behavior and information that intended to increase one's motivation to quit. The intensive treatment program involved lectures, demonstrations, practice exercises, the teaching of self-control procedures, and a novel aversion method. Topics covered at the sessions included attitudes related to the quitting process, cognitive control of cigarette cravings, health hazards of smoking and the benefits of quitting, the use of covert sensitization, eating management skills, relaxation training, mental imagery exercises, behavioral rehearsal, stimulus control, use of positive reinforcement, and the development of incompatible behavior. The major goal of treatment was skill development. In a highly structured, systematic way, the program aimed to teach subjects how to prevent cigarette urge sensations from developing, and how to eliminate any urge sensations that did occur.

Two innovative aversive strategies were introduced in the study. Subjects were asked to smoke a total of four cigarettes at each meeting under situations that highlighted the negative aspects of cigarette smoking. The aversive conditioning apparatus consisted of (a) a large ashtray filled with cigarette litter placed in front of each subject; (b) cigarette filters that were dipped in a bitter tasting anti-nail biting solution; (c) a tape recording of loud white noise; and (d) a slide show presentation of diseased organs resulting from smoking interspersed with popular magazine cigarette advertisements. Subjects were instructed to smoke the first

two cigarettes using a procedure called "pinky puffing," in which the cigarette is held between the last two fingers of the subject's nonsmoking hand, brought to the side of the mouth opposite that with which the subject usually smokes, and is puffed rather than inhaled. Puffing causes a buildup of bitter nicotine residue on the tongue and holding the cigarette in this manner becomes irritating. The second aversive procedure is called "smoke signaling." A subject places the cigarette in his or her mouth and puffs quickly, without inhaling, which causes a hot sensation around the lips and an accumulation of smoke in the eyes. Participants were told they could terminate the aversive procedure at any time they chose. Windows were opened and a large floor fan was used to clear the room of smoke between trials.

At the end of the program, subjects were assigned to one of three conditions: a 4-week support group which offered an opportunity to discuss feelings and thoughts; a telephone contact system which allowed subjects to phone one another but not the experimenter; and a no-contact control group. At the final session, members of all groups received a series of self-help maintenance messages developed by the American Health Foundation (8).

## RESULTS

After the treatment phase of the study, subjects were assigned to one of three maintenance conditions. A one-way analysis of variance was used to test for equivalence in mean age, base smoking rates, and number of years subjects smoked (Table 1). There were no significant differences on these variables among the groups.

At the end of the treatment phase, all subjects reported total abstinence. At the 2-month follow-up evaluation, 84% of subjects reported that they had remained abstinent. At the end of 4 months, 82% of the subjects were abstinent, and at 6 months, 39 subjects reported that they were still ex-smokers, leaving 76.5% of the original sample abstinent. One year following the end of treatment all subjects but one were contacted by mail or telephone. With the conservative assumption that this one subject had returned to smoking, 32 subjects or 63% of the original group

TABLE 1  
MEAN AGE, NUMBER OF QUITTING ATTEMPTS, BASELINE SMOKING RATES, AND  
NUMBER OF YEARS SMOKED FOR EACH OF THE THREE TREATMENT GROUPS

	Support		Telephone		Control		Total	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Age	36.8	12.3	35.5	11.4	35.4	13.5	35.9	12.2
Number of previous quitting attempts	10.5	25.7	2.8	2.2	1.7	2.4	5.0	15.2
Number of years smoked prior to this quitting attempt	18.7	10.8	17.5	11.0	16.1	13.6	17.5	11.7
Number of cigarettes smoked per day	31.1	13.3	27.4	9.2	30.1	14.2	29.8	12.3

TABLE 2  
PERCENTAGE ABSTAINERS IN EACH MAINTENANCE CONDITION AT EOT, 2, 6, AND 12 MONTHS POST-TREATMENT

Maintenance condition	EOT		2 Months		6 Months		12 Months	
	%	N	%	N	%	N	%	N
Support group	100	17	88	15	76	13	65	11
Telephone contact	100	17	76	13	65	11	59	10
Control group	100	17	88	15	88	15	65	11 <sup>a</sup>
Totals	100	51	84	43	76.5	39	63	32

<sup>a</sup> The experimenter was unable to contact one subject in this group at 12 months post-treatment. It was therefore assumed that this subject had resumed smoking.

had remained abstinent 1 year following treatment. The number of subjects in each group who were abstinent at the end of treatment (EOT), and at the end of 2, 4, 6, and 12 months is presented in Table 2.  $\chi^2$  Analyses revealed no significant differences among groups in the number of recidivists at all follow-up periods. Figure 1 presents the abstinence percentages.

Abstinence data were also analyzed to determine success rate differences between men and women. At the 6-month follow-up, 76% (8) of the women and 77% (5) of the men were abstinent. One year post-treatment, 66% (10) of the women and 59% of the men were abstinent (see Table 3).

At the completion of the 2-month follow-up questionnaire, there were eight recidivists, five of whom had returned to smoking within 2 weeks post-treatment. The recidivists were smoking at 46% of their baseline rates. Although they had resumed smoking, seven of them reported on the 2-month follow-up questionnaire that they had some degree of control over their urges for cigarettes. At the end of 4 months, recidivists were smoking at 57% of their baseline levels, and at 6 months

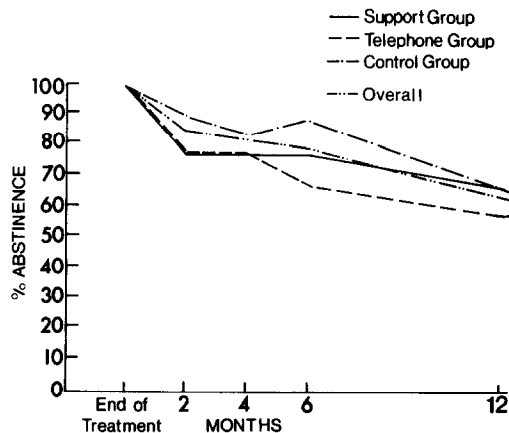


FIG. 1. Abstinence percentages post-treatment for each of the treatment groups.

TABLE 3  
 PERCENTAGE WOMEN ABSTAINERS VS MEN ABSTAINERS AT EOT, 2, 6, AND  
 12 MONTHS POST-TREATMENT

Sex	EOT		2 Months		6 Months		12 Months	
	%	N	%	N	%	N	%	N
Women	100	29	83	24	76	22	66	19
Men	100	22	86	19	77	17	59	13
Totals	100	51	84	43	76.5	39	63	32

were smoking at 52% of their baseline rates. Reduction data were not gathered 1 year post-treatment. Combined reduction rates for all subjects are presented in Fig. 2.

At the end of treatment, subjects were asked to rate subjectively their status as a nonsmoker, ranging from an extremely comfortable nonsmoker to a smoker. Thirty-five subjects (68.6%) indicated that they were somewhat comfortable nonsmokers.

In response to rating how well they could control cigarette urges, all subjects reported that they could control their urges, at least to some extent. Subjects were asked to rate how much difficulty they had in quitting. Most subjects (76.4%) found the quitting process to be either moderately difficult, difficult, or very difficult. Two subjects rated the process as very difficult, twenty rated it as moderately difficult, ten rated it as easy, and two rated the process as very easy.

Responses from abstainers and recidivists on the 2-month follow-up questionnaire were analyzed separately. In rating comfort as a nonsmoker, 97.7% of those abstinent reported being either extremely comfortable, moderately comfortable, or somewhat comfortable as a nonsmoker. One hundred percent of abstainers reported that they could either control or totally control their urge to smoke. As to the degree of difficulty in quitting, 40% of those abstinent found the quitting process to be easy or very easy.

The small number of recidivists in each of the three maintenance conditions precluded the use of the smoking rate and abstinence percentages as a measure of differential effects due to treatment. In order to compensate for this problem, responses on the 2-month follow-up questionnaire completed by the 43 abstainers were studied to determine if the three maintenance procedures had differential effects on degree of comfort as a nonsmoker, amount of desire for cigarettes, ability to control urges, degree of difficulty encountered in quitting, changes in weight, changes in alcohol consumption, and ratings of program satisfaction.  $\chi^2$  Tests of independence were used to analyze these results. No test yielded significant differences between the groups except the subjects in the support group gave higher ratings of program satisfaction than subjects in the other two conditions ( $\chi^2(4) = 9.85, P < 0.05$ ).

Analysis of changes in weight after 2 months for all 51 subjects showed that 28 subjects gained weight, 4 lost weight, and 19 remained at the same weight. For those who gained weight, the range was from 3 to 20 lb, with a mean of 8.96 lb.

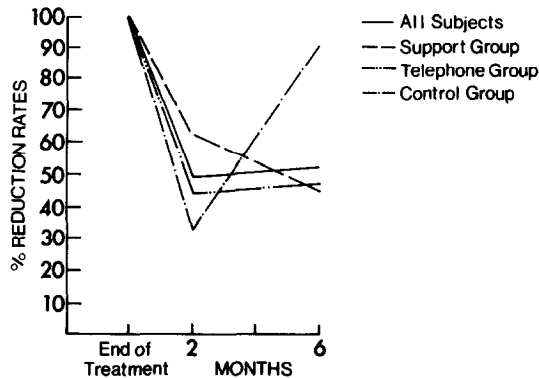


FIG. 2. Percentage reduction rates for each of the treatment groups and the combined sample post-treatment.

The range for those who lost weight was 5 to 12 lb, with a mean of 7.4 lb. The mean weight change for all subjects was an increase of 4.69 lb. The mean weight change for abstainers was also 4.69 lb. These weight data were gathered from self-reported responses on the 2-month follow-up questionnaire.

## DISCUSSION

The most significant finding of this study was high abstinence rates resulting from the intervention strategies. The 100% abstinence rate post-treatment and 63% abstinence rate at the 12-month follow-up appear to be superior to the majority of results shown in the smoking cessation literature. These results compare favorably with the review of cessation studies by Schwartz (33), who estimated post-treatment success rates to be between 65 and 75% and McFall and Hammen (25), who found post-treatment success rates to range from 7 to 40%. The results are also encouraging in light of Lichtenstein and Danaher's (21) review which showed a 20–25% abstinence rate at 12 months post-treatment. One must be cautious in interpreting these data, however, as major reviews of the aversive smoking cessation literature have noted long-term quit rates of 60–70%, but few of these successes have been replicated (7).

The findings are also encouraging in light of the reported result that at 2 months 40% of the abstainers found the quitting experience to be easy or very easy. It is the authors' opinion that a problem with previous smoking cessation strategies was that participants experienced a great deal of difficulty quitting, and therefore many would return to smoking to alleviate smoking withdrawal discomforts. Discussions with smokers who failed to quit have led the authors to believe that this difficulty also tended to discourage subsequent quitting attempts because the smokers wanted to avoid further "suffering." A smoking cessation program that cannot only help participants effectively quit smoking, but can also make quitting an easy process, is truly advantageous.

One-year data on the percentage of women abstainers (66%) versus the percentage of men abstainers (59%) are interesting. There is some evidence suggesting that it is more difficult for women to stop smoking than men (14, 17). The present

study appears to present a smoking cessation program which shows no sex differences. If this finding can be replicated, the study becomes more significant because of the large number of women who wish to quit, but have not been successful.

The information gathered about weight change is also important. In formal interviews with smokers, the authors have learned that many will not attempt to quit because of fear of weight gain. They do not want to replace one bad habit with another bad one. At 2 months, the 43 abstainers gained an average of only 4.69 lb. This appears to be a tolerable side effect for achieving smoking abstinence. A specific part of the program geared toward the teaching of eating management skills may help explain this statistic. Also, the finding that many participants found quitting easy might mean they found it unnecessary to substitute food for cigarettes.

Another positive aspect of the intervention strategy is its short duration. A 5-day program precludes the large number of dropouts reported among many programs that have weekly meetings. The American Cancer Society group leaders have cited as much as a 50% dropout rate over the 8-week program. The increased effectiveness of this "cold turkey" approach is supported in the literature (9, 14).

One must look at the implications of the aversive procedures used in the study. It appears that pinky puffing and smoke signaling avoid the dangers associated with rapid smoking, blowing, warm smoky air, and electric shock. Since cigarette smoke is not inhaled, there is no extra stress placed on the cardiopulmonary system as with the methods above. The traditional aversion techniques are limited since they cannot be employed with subjects at risk for coronary heart disease and chronic lung obstruction—people who are in great need of effective smoking interventions. Pinky puffing and smoke signaling may be a critical element of the program and appear to be safe aversive procedures. A future study is planned to analyze the exact physiological changes which take place during the "puffing" procedures. A second study is planned to isolate the importance of the "puffing" aversions in the multiple treatment program.

The high abstinence rates demonstrated by the study cannot be attributed to the emphasis on maintenance procedures. The success was so great across all three groups that evidence cannot be provided to support the use of a maintenance procedure over a no maintenance condition. All groups did receive the self-help maintenance message manual and this alone may be an effective maintenance component. In addition, the smoking cessation skills which participants learned during the program were appropriate maintenance procedures, as well. That is, participants reported utilizing these self-control techniques to overcome the desire to smoke and thus remain abstinent.

Since the sample size for each maintenance condition was small, and replication has not been performed, more research in this area is needed. Future studies should compare support groups, telephone contact systems, no contact controls, maintenance messages, and self-control maintenance techniques, to determine which procedures together or alone prove to be most effective (4, 8, 18, 37, 38). Novel maintenance procedures such as experimenter telephone calls, mailings, negative smoking booster sessions, a buddy system, and subject-organized discussion sessions could all be explored.



Another possible reason for the high success rates of this study is the multiple treatment dimension. Subjects were taught numerous techniques designed to prevent and eliminate urges; more than have previously appeared in the existing literature. The methods that worked best for one person were not necessarily those that worked best for another. The subjects who learned many cessation procedures could then select methods most effective for their particular needs, based upon their personality characteristics and the type of smoker they might be. Since the smoking cessation research, as yet, has not been able to tailor treatment programs to individuals, this type of multiple treatment approach appears to be appropriate.

In proposing other possible explanations for the high success rates one cannot rule out the possible effects of group interaction. This was minimal, however, as the group presentations were didactic. Another factor may be that one of the experimenters (D.P.) served as the program leader. Future research should examine the effects of program leaders on success rates.

A major criticism of the study is that the outcome data are self-reported. This creates controversy over the validity of measurements. The authors concede this methodological weakness. The senior author is presently replicating this study using thiocyanate measures to corroborate self-reports. It can be stated, however, that at 1 year post-treatment, subjects would be less likely to give inaccurate self-reports than they would at short-term follow-ups.

The absence of a no treatment control group also might be considered a methodological weakness, as it increases the likelihood that outcome data may be based on factors independent of the described intervention strategies. The authors were concerned with the ethical issue of withholding treatment from people who needed to quit smoking for health reasons. We decided to use as control the dozens of studies which employed no treatment control groups and found that 5–15% of these subjects quit on their own (4, 31).

In summary, this study accomplished its goals of assessing the effectiveness of a 5-day smoking cessation program, and analyzing the effects of two types of maintenance procedures. Replication of the study is needed to confirm our findings, but it appears that an innovative yet efficacious smoking cessation treatment package has been developed. The data look promising and provide some cause for optimism in the search for successful smoking cessation strategies.

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