

379  
N81d  
No. 1179

CIGARETTE SMOKING BEHAVIOR: SELF-MANAGED CHANGE

DISSERTATION

Presented to the Graduate Council of the  
North Texas State University in Partial  
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Paul Wesley Taylor, B.S., M.S.

Denton, Texas

May, 1977

1/2 RB

Taylor, Paul Wesley, Cigarette Smoking Behavior: Self-Managed Change. Doctor of Philosophy (Clinical Psychology), May, 1977, 66 pp., 7 tables, 1 figure, bibliography, 67 titles.

Reviews of the literature on cigarette-smoking-control programs indicate that effects achieved do not extend beyond the treatment period. Most of these programs are experimenter-managed and the treatment occurs within the laboratory. This suggests that programs managed by the subject, enabling treatment to occur in the natural environment, might have a longer-lasting impact on cigarette smoking behavior.

In the present study, three self-managed treatment programs were compared with respect to their ability to effect and maintain change in the cigarette smoking behavior of 27 subject volunteers from the population of employees of a Veterans Administration hospital. Subjects were randomly assigned to a self-imposed delay group, a self-directed relaxation group, and a self-monitoring group. The experimental program lasted 6 weeks with a 20-minute individual meeting each week. Three months following treatment, subjects were contacted by mail and were asked to monitor their smoking behavior for one week, and to return their average daily smoking rate by mail.

The results of a 3 x 3 analysis of variance procedure indicated that only the self-imposed delay group reduced

its smoking behavior significantly, and that the change was maintained for 3 months following treatment termination. However, the three procedures did not differ on the percentage of abstinence produced or maintained.

Combining the three groups, there was a 53% reduction in smoking at the end of the treatment. Three months later, there was a 32% reduction. Of the total number of subjects, 36% were abstinent at treatment termination, and 45% of these relapsed during the 3-month follow-up period.

The results provide support for the effectiveness of the self-management technique of self-imposed delay as a durability-enhancing treatment procedure. The effectiveness of self-management techniques as a general class of treatment strategies was not supported. A task for future research would be to establish the effectiveness of the delay technique implemented earlier in the cigarette smoking chain, as well as to determine whether effectiveness is increased or decreased by a specification of the content of a delay interval.

TABLE OF CONTENTS

	Page
LIST OF TABLES . . . . .	iv
LIST OF ILLUSTRATIONS . . . . .	v
Introduction . . . . .	1
Method . . . . .	17
Subjects	
Materials and Apparatus	
Procedure	
Design	
Results . . . . .	24
Average Daily Consumption	
Other Comparisons	
All Subjects	
Discussion . . . . .	31
Appendices . . . . .	40
References . . . . .	58

LIST OF TABLES

Table	Page
1. Means of Subject Characteristics for the Three Groups . . . . .	23
2. Analysis of Variance of Average Daily Cigarette Consumption . . . . .	25
3. Analysis of Variance for Effect of Time Periods for Each Treatment Group . . . . .	26
4. Number of Subjects Completing Program, Reaching Abstinence, and Maintaining Abstinence for the Three Groups . . . . .	28
5. Thiocyanate Analysis of Subjects who Reported Abstinence at Treatment Termination . . . . .	29
6. Relationship between Intensity of Habit and Level of Reduction Achieved and Maintained . . . . .	30
7. Reduction and Abstinence Percentages at End of Treatment and Follow-up for All Subjects . . . . .	32

LIST OF ILLUSTRATIONS

Figure	Page
1. Average Daily Cigarette Consumption by Treatment Weeks and Follow-up for the Three Groups . .	27

## CIGARETTE SMOKING BEHAVIOR: SELF-MANAGED CHANGE

Several reviews of the literature on studies of attempts to modify excessive or addictive behaviors contain the conclusion that relapse is one of the critical issues. The abusive use of various substances (food, tobacco, alcohol, "drugs") is often curtailed during active treatment programs, but the moment treatment termination occurs, most new non-abusers soon return to substance abuse (Bernstein, 1969; Callner, 1975; Hall & Hall, 1970; Hunt & Bospalec, 1974; Hunt & Matarazzo, 1973; McFall & Hammen, 1971).

Bernstein's (1969) evaluative review of the cigarette-smoking-control literature reported through 1968 was seminal in directing investigators to refocus their research, from questions exclusively about short-term behavior change to questions about maintenance variables as well. Despite the fact that nearly eight years have elapsed since Bernstein's definitive review and despite the fact that nearly all reports on smoking control have included follow-up data, few meaningful maintenance variables have been identified and relapse following treatment termination continues to be a critical issue.

Hunt and Matarazzo (1973) as well as Hunt and Bospalec (1974) have extensively studied the relapse curve associated

with smoking withdrawal and also other substances of abuse. On the basis of a review of 186 studies reporting on methods to modify smoking, these authors describe the cigarette smoking relapse curve as negatively accelerated, as breaking sharply at about the 3- to 6-month point, and as asymptoting well above zero so that about 25% appear to be lastingly affected by the treatment program. It is important to note that the 25% is based on those that finished a program successfully. When using percent reduction from base rather than abstinence, the relapse curve (Hunt & Bespalec, 1974) has the same steep drop with a 60% relapse within 3 months. An interesting aspect of these relapse curves is their steepness. From end of treatment to 3-months post-treatment about 90% of the relapse occurs. Again, this appears to be the case for other substances of abuse as well, notably alcohol and heroin.

The high rate of recidivism following substance-abuse treatment programs greatly attenuates the value of them, no matter the noteworthiness of their short-term success. Those who design programs to assist others in modifying their behavior with respect to the abusive use of substance might describe their efforts to date in a way similar to W. C. Fields when commenting about drinking, "There is no problem in helping people to quit. We do so thousands of times. The problem is that it appears to be the same people, over and over again."



Approaches to the problem of relapse can be conceptualized as involving one of three general strategies. The first strategy entails an attempt to identify factors occurring subsequent to treatment termination, such as number and spacing of follow-up meetings or contacts with or without part or all of the active treatment program (Bernstein, 1970; Chapman, Smith & Layden, 1971; Hall, Hall, Borden, & Hanson, 1975; Vogler, Lunde, Johnson, & Martin, 1970; Vogler, Lunde, & Martin, 1971). A second strategy involves the identification of effective maintenance mechanisms which can be utilized independent of the therapist, such as self-help groups organized and maintained by the newly abstemious substance abuser (Bourne & Fox, 1973; Glatt, 1975; Goldfarb & Hartman, 1975). The third approach involves an attempt to identify aspects of active treatment programs which generalize to the natural environment and can be utilized by the patient independent of second-party involvement, such as training during treatment in techniques manageable by the person in need of them.

This final approach, generally referred to as self-management, will be evaluated by the present study. Before developing the rationale, it should be noted that the three general strategies presented in the above conceptualization are not exhaustive of the approaches taken to attenuate the relapse effect. Therapeutic communities for "drug" abusers (DeLeon, 1973) and disulfiram implantation for

alcohol abusers (Lewis & Bland, 1975) represent other efforts designed to combat relapse.

Terminological confusion exists in the self-management literature. It is important to distinguish among three basic terms: self-regulation, self-control, and self-management. Self-regulation, as defined by Kanfer and Karoly (1970), is "concerned with the processes by which an individual alters or maintains his behavioral chain in the absence of immediate external supports" (p. 406). Self-regulation, then, is descriptive of the process whereby an individual directs his continuous, daily behavior. Componentially it includes self-observation, self-evaluation (which implies a subjectively held standard) and self-reinforcement. Self-regulation is appropriately applied to behavior processes of a non-problematic nature. It is that self-generated process which keeps behavior non-problematic and which can be separated, at least conceptually, from externally imposed controlling influences.

Self-control is considered to be a special case of self-regulation (Kanfer, 1970, 1973; Kanfer & Karoly, 1970). Lopatto and Williams (1976) define self-control (as a learning variable) as "the performance of operant responses whose previous probability of occurrence has been less than that of alternatively available behaviors" (p. 3). In speaking of self-control, Skinner (1953) made an important distinction between controlling and controlled responses. The controlled

response (or the response to-be-controlled) is the target behavior with a high probability of occurrence. The controlling response is whatever the organism does to prevent the occurrence of the high probability response to-be-controlled. It should be noted that self-control describes both a "denial" and an "effortful" contingency. A denial contingency involves reducing the frequency of occurrence of a target behavior--whereas an effortful contingency involves an increased rate of occurrence of a target behavior. In the former, there is a rate excess; in the latter there is a rate deficit. In the problem area of substance abuse, rate excesses occur and a denial contingency is appropriate. The limited scope of the concept of self-control is perhaps made clearer by two further qualifications. The first is that in order to designate a response as a self-controlling one, the organism must be free to emit or not to emit the response. If the response is blocked by external means, it is adequately accounted for by external control variables and only the response which engineered its blocking can be viewed as being within the scope of the concept of self-control. The second qualification concerns itself with the notion that early responses in a self-controlling chain may require external support (from a therapist). Middle responses in the chain are performed in the absence of external supports. Terminal responses are maintained by external supports in one's natural environment. Both the initial and terminal

aspects of this chain are adequately accounted for by the therapist's influence in the case of the former, and by the social forces in one's community in the case of the latter. Only the intermediate (or transitional) part of the chain requires the concept of self-control. Additionally, once the behavior is brought under control and maintained, the nature of the consequence changes which historically attend the behavior. If the consequence of a controlled behavior becomes immediately punishing, that alone is sufficient to account for the observed alteration in probability of occurrence (Kanfer & Karoly, 1970; Skinner, 1953).

Self-management is defined by Mahoney (1972) as "any response made by an organism to modify the probability of another response." Self-management is what an organism does to regain control over a behavior. Self-management differs as a concept from self-regulation in that it applies to problematic behavior. It differs from self-control in that self-management applies to the case in which controlling responses may be reinforced and/or maintained by second parties or other external supports. To illustrate, self-regulation describes the daily behavior of an individual which prevents the occurrence of problem drinking. Self-control applies at the moment an individual confronts a choice point (to drink or not to drink) and chooses the low probability option, in the absence of any external compelling force. Self-management applies when an individual ingests antabuse

to prevent the occurrence of the drinking response. The ingestion of antabuse may itself be supported by external agents but not compelled by them as in implantation.

Self-management (SM) techniques have been categorized into three basic forms: environmental planning, behavioral programming, and coverant control (Mahoney, 1972; Thoresen & Mahoney, 1974). Environmental planning strategies highlight features of a person's environment and entail the elimination or avoidance of the occasion for being influenced by an eliciting or a discriminative stimulus. Behavior programming emphasizes the consequences of a behavior and includes the strategies of self-monitoring, self-reward, and self-punishment. Coverant control entails a technology of modifying internal antecedent or consequent stimuli.

Before a technique is designated as belonging in a class of approaches to behavior change labeled self-management, it must conform to one or more of the following criteria:

1. A discrete occurrence of the self-management technique must be possible independent of the involvement of other parties.
2. The technique must be transportable to the individual's natural involvement.
3. The technique must be available at the time and the site of occurrence of the target behavior.
4. The individual must be free (in a physical sense) to utilize or not to utilize the technique.

Thoresen and Mahoney (1974) have suggested that self-management be distinguished from other-management on the basis of a continuum rather than a dichotomy. The critical aspect is that the crucial stimulus be available to the individual and the self-management technique be involved in postponing, perhaps indefinitely, consummation of it. There is little need to utilize self-management variables in accounting for the non-drinking response among alcoholics in a locked hospital ward. The lock is sufficient to account for its non-occurrence.

Several studies have demonstrated an equivalency between self-managed and other-managed strategies for short-term behavior change (Bandura, 1967; Glynn, 1970; Johnson & Martin, 1972; Kanfer & Duerfeldt, 1968; Lovitt & Curtiss, 1969). Within the area of substance abuse, only the weight-management literature contains comparisons between the two treatment paradigms, having ambiguous results. Two illustrative studies from this literature are reviewed as background for the development of the approach of the present study.

Hall (1972) compared a self-control and a therapist-control behavioral treatment with 10 overweight women. The subjects were divided into two groups of five each. One group received the self-control program for 5 weeks and the therapist-control program for the second 5-week period. The order of treatments was reversed for the other group. The self-control treatment included instructions in manipulation

of emotional responses, narrowing of stimulus control of eating, weakening of chains leading to eating, and "doing something else" instead of eating. The therapist-control procedure entailed the choosing of a reinforcer by the subject which cost less than \$20.00 and which symbolized weight loss. Each subject was given \$5.00 to put the item on layaway. If a subject reached an individually established goal, the remaining \$15.00 was to be provided. Group 1 subjects lost an average of .48 pounds per week during the self-control phase and .94 pounds per week during the therapist-control phase. Group 2 subjects lost an average of .65 pounds per week during the self-control phase which followed the therapist-control phase during which an average of 1.1 pounds was lost per week. During a 4 week follow-up Group 1 continued a slight weight loss while Group 2 experienced a slight increase in their end-of-treatment weight.

Harris and Bruner (1971) compared a self-control and a contract procedure for weight control with 24 subjects. The self-control procedure entailed instructions in "rudiments of behavior theory," supplemented by a listing of their reasons for wanting to lose weight with instructions to read the list as punishment for overeating. The contract procedure consisted of a cash deposit equaling the number of pounds a subject wanted to lose to be returned at the rate of \$1.00 for each pound lost. One dropped out of the self-control group and 7 subjects failed to attend following the

first contract group meeting. The 11 subjects completing the self-control program lost an average of 7.4 pounds over a 12-week period which reverted to an average of 3.5 at a 10-month follow-up. The 5 contract participants lost an average of 13.4 pounds during the 12-week period of treatment. At the 10-month follow-up, they had regained the weight loss plus an additional 2.75 pounds.

As can be seen from these two illustrative studies, the self-management approach utilized is a multicomponent one and only a rather general comparison is allowed between the two classes of techniques. Mahoney (1972) has argued for comparative studies within a self-management paradigm. Mahoney, Moura, and Wade (1973) compared three of the more popular self-management techniques in a study with 53 obese adults. The subjects were assigned to one of five groups: a self-reward group, a self-punishment group, a group combining self-reward and punishment, a self-monitoring group, and an information control group. After 4 weeks of treatment, self-reward subjects (rewarded themselves for weight loss with a portion of their own deposits) lost significantly more weight than either self-monitoring or control subjects. At a 4-month follow-up, those who had received self-reward instructions (the self-reward group and the self-reward/self-punishment group) continued to show greater improvement than either the self-punishment or the control subjects.



Since the self-reward and self-punishment procedures were transacted at weekly weigh-ins, an analysis of follow-through of the self-management procedures was possible. The rate of follow-through was 58.1% for self-reward, 57.6% for self-punishment, and 67.1% for the "combined" group.

Mahoney (1974) compared self-reward for weight loss versus self-reward for habit improvement by refunding a portion of the deposit for appropriate weight loss or appropriate eating-habit change. The self-reward for habit-improvement group lost more weight than the self-reward for weight-loss group. The difference between the two was insignificant with a 2-month follow-up, but at a 1-year follow-up, the habit-improvement group was clearly superior.

These two studies suggest that self-reward is superior to self-punishment for short-term and long-term weight loss and that self-reward is best applied to habit improvement rather than to actual weight loss.

There are numerous methodological issues which exist in the cigarette-smoking-control literature. These are briefly reviewed. Typically, cigarette smoking behavior is assessed by the smoker himself and reported to the experimenter. This report usually takes the form of the number of cigarettes smoked per some specific unit of time. A problem here is that self-observation has a reactive effect. Jeffrey (1974) suggests that a minimum precaution requires allowing the reactive effect to stabilize before instituting the

treatment procedure. Recording devices to assist in efficient and accurate data collection have been reported by several investigators (Arzin & Powell, 1968; Lindsley, 1969); however, reliability is not assured by these technical aids. Jeffrey (1974) suggests that independent observations are needed to supplement self-observations. For the purpose of the present study, it was assumed that no systematic bias operated to differentially affect the reliability of the data reported by the three groups to be compared.

Once procedures are implemented to guard against unintentional distortion of data, the necessity for ruling out deliberate deception remains. Of 107 "ex-smokers" followed-up after one year, 22 had carbonxyhemoglobin levels of over 2% and when directly challenged, 8 of these admitted to continued smoking (Delarue, 1973). Several investigators have shown that both serum and plasma thiocyanate and blood carboxyhemoglobin concentrations are higher in smokers than in non-smokers (Astrup, 1967; Dastur, Quadras & Wadia, 1942; Densen, Davison, Bass, & Jongs, 1967; Goldsmoth & Landson, 1968; Maliszewski & Bass, 1955; Pettigrew & Fell, 1972; Wilson & Matthews, 1966). The half-life of thiocyanate concentration occurs at two weeks after abstinence, whereas carboxyhemoglobin remains elevated only for a period of several hours after cessation of smoking. Therefore, serum or plasma thiocyanate concentration provides a more practical

indication of a person's smoking habits according to Butts, Kuehnemann, & Widdowson (1974) who developed an automated method for determining serum thiocyanate concentration. When applied to 197 individuals, only 5 misclassifications occurred--three of which were false-positive and two of which were false-negative. As developed to date, this procedure provides a corroboration of self-reports of abstinence rather than reduction (non-zero) of number of cigarettes smoked. The Butts et al. (1974) procedure was utilized by the present study for subjects reporting abstinence.

A critical methodological issue in research on self-management techniques is the method of evaluation of the consistency with which participants "follow-through." Mahoney and Thoresen (1974) point out that "it makes little difference whether some technique would be effective if implemented when such implementation is either nonexistent or not evaluated." They suggest that a portion of the field study be restricted to an experimenter-monitored situation.

There are two aspects to the problem of subjects dropping out of experimental studies: how to prevent them from doing so and how to analyze the effect of treatment if efforts to prevent drop-outs fail. One approach utilized to decrease dropout rates requires each subject to deposit a sum of money with the experimenter until the completion of the study (Best, 1975; Best & Steffey, 1971; Keutzer, 1968). Bernstein (1969)

argues for the exclusion of drop-outs from analysis of treatment effectiveness since they do not receive the treatment. McFall and Hammen (1971) assert "that drop-outs are best viewed as treatment failures . . .", contending that smokers often withdraw from treatment for reasons directly related to the treatment program and "at the very least, their withdrawal reflects the programs inability to captivate and hold smokers."

Several studies have shown that the presence of non-specific factors such as experimenter-attention and subject-motivation can be at least as effective as specific treatment techniques in the modification of smoking behavior (Bernstein, 1969; Keutzer, 1968; McFall & Hammen, 1971). McFall and Hammen also suggest that future studies aimed at developing clinical stop-smoking treatments might reasonably consider the reduction curves and quit rates from their 1971 study as a minimum standard against which to evaluate their own specific treatment effects. These investigators "treated" 30 undergraduate college student cigarette smokers by having them count each cigarette smoked for three weeks, hand in their smoking record sheets twice weekly, and telling them to attempt to reach abstinence on their own. At the end of the treatment period, the average reduction from baserate smoking was about 70%, at the end of a six week follow-up about 40%, at the end of a six month follow-up about 20%. By the end of treatment, 26% achieved abstinence, 10% remained abstinent at

six weeks, and 5% at six months. It should be noted that self-monitoring was both the means of measuring the dependent variable (number of cigarettes smoked) and a non-specific treatment procedure. Virtually all recently reported studies on the treatment of cigarette smoking utilize self-monitoring as a measurement procedure.

Wagner and Bragg (1970) compared four behavior modification approaches to the treatment of 54 cigarette smokers. One of the procedures entailed relaxation training and instructions to practice relaxation between each of the eight treatment sessions. Subjects in this group were told that smoking resulted from tension and that relaxation training and practice would lower the level of tension decreasing the need for cigarettes. Of the 7 who finished the relaxation aspect of the study and on whom data is presented, the average end-of-treatment reduction was 77%; this became 54% at a three month follow-up. No data were presented on the 4 who dropped out. This was one of the earlier studies which utilized relaxation training for the treatment of cigarette smoking. It was not, strictly speaking, conducted within a self-management paradigm because there was no attempt to encourage its connection with the response to be controlled. An extension of this kind occurred in a study by Sutherland, Amit, Golden, and Roseberger (1975). After receiving experimenter training in a full relaxation procedure, 13 were taught a shorter ritualized version which was to be substituted

for the cigarette-smoking response whenever "a cigarette was strongly desired" outside the experimental setting. No information was provided on drop-outs. The treatment period covered nine weeks. Cigarette consumption was reduced 43.6% of original intake during treatment, reverting to 35% at a three month follow-up. One reached abstinence during the treatment period. Insufficient data were provided to determine whether abstinence was maintained. Interestingly, when the above relaxation procedure was combined with a rapid smoking "satiation" technique, 5 of the 13 reached abstinence and at least 4 of the 5 maintained for three months.

Meyer (1973) introduced a behavioral-management technique which he designated delay therapy, defined as any technique that achieves the imposition of a delay period between the experience of an impulse and its consummation. He asserted "that a continued confrontation of the impulse via the delay period will result in its dissipation." Meyer reported on the utilization of this technique with a 32 year old woman who sought help in managing her weight. The delay entailed contracting to telephone the therapist whenever she could no longer resist an impulse to eat. During a three-month treatment period, the patient lost 29 pounds. Her treatment goal was to lose 30. He reports that at seven months, treatment gains had been maintained.

Fredericksen and Peterson (1975) utilized a delay technique to assist a group of eight cigarette smokers achieve

"controlled" smoking. The delay was self-imposed between removing a cigarette from its package and lighting it. Each subject met with the experimenter for four weekly individual meetings. The delay periods were 1 minute for the second week, 2 minutes for the third week, and 5 minutes for the fourth week. The four who completed the study reduced their consumption to about 50% of initial intake. All but one of the four returned essentially to pre-experimental rate within four months post-treatment.

The approach taken in the present study was to compare the two self-management strategies of self-directed relaxation and self-imposed delay with respect to immediate and long term results on the behavior of cigarette smoking comparing the two with a self-monitoring control group.

### Method

#### Subjects

The subjects were recruited from the population of employees of the Veterans Administration Hospital and the Medical University of South Carolina, both in Charleston, South Carolina, through an announcement containing the following information:

1. Volunteers are sought for an experimental cigarette smoking reduction program.
2. Participants must be at least 21 years of age, must smoke at least 15 cigarettes per day, and must have been smoking for at least two years.

3. A \$15.00 deposit will be required of all participants, refundable upon returning all equipment and turning in all data including follow-up.

4. To make application contact the VA Psychology Service for an appointment before \_\_\_\_\_.

A 30-minute intake meeting with the experimenter was arranged individually for each applicant, during which the following occurred:

1. A program application was filled out, a copy of which is attached as Appendix A.

2. The informed consent agreement (attached as Appendix B) was read by the applicant. The applicant's attention was directed to the following details of the agreement: (a) deposit, (b) blood test, (c) statements about the procedures, and (d) duration of the program and follow-up procedure.

3. A standard response was given to any question regarding the program: "All of the procedures have been demonstrated to be effective with some people. I cannot give any further information at this time."

4. Applicants who signed the agreement were assigned sequentially in order of their appearance to each of the three groups. The first subject was assigned to Group 1, the second to Group 2, the third to Group 3, the fourth to Group 1, etc., until 9 subjects were obtained for each group, making a total of 27 subjects.



5. The deposit was collected.

6. A wrist counter and a file folder were issued. Each subject was instructed to begin counting each cigarette consumed beginning with the first cigarette on the day following the intake meeting. Specifically the instructions were: "At some point before lighting a cigarette, as you are reaching for one, for example, advance your counter. Before having your first cigarette on the second day, record your previous day's total on the graph provided in your file folder. Reset your counter to zero. Make no attempt to restrict your tobacco intake. Smoke as you normally would and simply make a record of your usual smoking behavior. Return in one week with your file folder with your data recorded."

7. A lab slip was issued and each subject was instructed to have a blood sample drawn before the next appointment.

8. Six weekly appointments (20 minutes each) were arranged.

#### Materials and Apparatus

The counting device referred to earlier enabled a continuous recording of smoking behavior as it occurred. The device is a wrist-worn single behavior counter. The counting movement records continuously to a maximum of 99 events.

The file folder issued to each subject contained a single sheet of graph paper with number of days written on the abscissa and number of cigarettes on the ordinate.

Subjects in the self-imposed delay procedure were issued a timing device which is worn on a belt or belt loop, or pinned to clothing. The device is set to any interval between 1 and 120 minutes and when the interval elapses a buzzing sound is emitted.

### Procedures

Self-Imposed Delay: Group 1. During the intake session, each was given a written statement of the rationale and a set of instructions covering the various steps of the procedure (attached as Appendix C). At the first experimental session smoking behavior was recorded on a graph maintained by the experimenter. The timing device was issued and instructions were given for its use. Specifically, each subject was instructed to let the detection of an urge to smoke serve as a cue to set the timer to a 5-minute interval and to refrain from having a cigarette until the timer sounded. The 5-minute interval was used for one week. At the second experimental session, instructions were given to extend the delay period to 10 minutes, and a 15-minute delay period was used beginning with the third session. At the fourth session, subjects turned in their timing device and attempted to impose delays of an unspecified period between an urge and a smoking response--unaided by the timing device. During the fifth experimental session, subjects were told that they should be able to refrain from all tobacco intake utilizing what they had learned about their smoking behavior

during the preceding weeks. At the sixth session, data and equipment were turned in and subjects were informed that they would receive a notice in the mail to monitor their smoking behavior for 1 week and to return their average daily consumption to the experimenter by mail (follow-up letter is attached as Appendix I). Those reporting abstinence were issued a lab slip and instructed to have a blood sample drawn two weeks later.

Self-Relaxation (Group 2). This group was given a written statement of the rationale and instructions for various steps of the procedure (attached as Appendix D).

Subjects turned in their baseline data during the first session after intake. Also during the first experimental session, they were taken through an experimenter-instructed relaxation procedure (Jacobsen, 1938, modified, Appendix E) and told to practice the full procedure once each day in the evening between sessions. Additionally, a shortened version of the relaxation procedure was taught (Sutherland, Amit, Golden, & Roseberger, 1975) and subjects were instructed to let the detection of an urge to smoke serve as a cue to perform the shortened relaxation procedure beginning with the first urge on the subsequent day. At the second, third, and fourth sessions subjects practiced the full relaxation procedure for 15 minutes on their own, demonstrated their use of the shortened procedure, and turned in their data. At the fifth session, subjects were told that they should be able to

refrain from all tobacco intake by relaxing to all internal cues for cigarette smoking. At the sixth session, all data and equipment were turned in and each was informed of the follow-up procedure to take place in three months.

Self-Monitoring: Group 3. Subjects were given a written statement of the rationale for and the procedural steps involved in self-monitoring. At each session after turning in baseline data, they were encouraged to reduce tobacco intake by monitoring alone. No specific advice regarding relaxation, doing something else, or delaying a response to an urge, was provided. At the fifth session, subjects were told they should be able to refrain from all tobacco intake. Data and equipment were turned in during the sixth session and the follow-up procedure was provided.

All subjects were provided a lab slip at the initial meeting and instructed to have a blood serum sample drawn prior to attending the second session. Those who reported achieving abstinence were provided a second lab slip, dated two weeks from treatment termination. Abstinence was corroborated by a thiocyanate level at least 50% reduced from the initial analysis.

#### Design

Nine subjects were assigned to each of the three groups, making a total of 27 subjects for the study. Groups were randomly assigned to the three procedures. A comparison is shown in Table 1 of the three groups by age, smoking history,

number of previous "quit" attempts and successes (defined as successful abstinence for a period of three months), and estimated daily consumption.

A one-way analysis of variance was performed on each of the five subject characteristic variables to assess initial differences among groups. A 3 x 3 analysis of variance procedure was used to analyze the results, with treatment groups as the between-subject variable and pre-testing, post- and follow-up testing as the within-subject variable. A chi square analysis was used to compare groups on number of subjects completing the study, number reaching abstinence, and number

Table 1

Means of Subject Characteristics for the Three Groups

Subject Characteristics	Groups*		
	Delay	Relax	Monitor
Age	32.1	33.1	38.3
Duration of habit (yrs.)	18.7	14.7	18.4
Quit attempts	1.1	1.6	2.0
Quit successes (3 months)	.4	.3	.8
Estimated daily consumption	28.1	29.4	35.0

\*Based on N who obtained treatment and were available at follow-up.

maintaining abstinence. A chi square procedure was also used to determine the effect of habit intensity on response to treatment.

### Results

One-way analyses of variance revealed no initial differences among the groups on age, duration of habit, number of previous quit attempts, number of previous quit successes (defined as three months of abstinence), and estimated daily consumption.

#### Average Daily Consumption

The average daily consumption was calculated for each subject based on a week of self-monitoring at the beginning of the study, during the sixth week of the study, and at the end of a 3-month no-contact period. The scores were analyzed using a 3 x 3 analysis of variance in which treatment group was the between-subjects variable, and pre-post-follow-up testing was the within-subjects variable. The results of this analysis are shown in Table 2. The treatment group was insignificant ( $p > .05$ ). The time-period effect and treatment-group by time-period effect were significant ( $p < .05$  and  $< .01$ , respectively), indicating that the number of cigarettes consumed varied as a function of the combined effect of treatment group and time period. An analysis of

Table 2

## Analysis of Variance of Average Daily Cigarette Consumption

Source	SS	df	MS	F
A (Groups)	911.8738	2	455.9369	1.6943
Subjects within groups	5920.3160	22	269.1053	
B (Time periods)	1175.6780	2	587.8390	4.1439*
AB	3789.8500	4	947.4625	6.6791**
B x Subjects				
within groups	6241.6290	44	141.8552	

\* $f_{.95} (2, 40) = 3.23$

\*\* $f_{.99} (4, 40) = 3.83$

simple effects of the time-period factor is shown in Table 3. The time-period effect was significant for the delay group ( $p < .05$ ) and insignificant for the other two groups ( $p > .05$ ), indicating that cigarettes consumed varied among time periods for the subjects in the delay group but not for subjects in the other two groups.

The Newman-Keuls procedure was used to compare the three time-period means for the delay group. The number of cigarettes smoked by the delay group subjects was significantly reduced between the pre- and post-testing period ( $p < .01$ ), and between the pre- and follow-up testing period ( $p < .01$ ). The difference between post- and follow-up testing was not significant ( $p > .05$ ).

Table 3  
 Analysis of Variance for Effect of Time Periods  
 For Each Treatment Group

Source	SS	df	MS	<u>F</u>
B for a <sub>1</sub> (time periods for delay group)	997.4210	2	498.71050	3.5156*
B for a <sub>2</sub> (time periods for relax group)	190.1635	2	95.0818	
B for a <sub>3</sub> (time periods for monitor group)	253.8115	2	126.9058	
B x subjects within groups	6241.629	44	141.8552	

\*F .95 (2, 40)=3.23

Profiles of the three groups are shown in Figure 1. The delay-group subjects reduced from 25 cigarettes each day during the pre-testing period to 10 cigarettes each day during the post-testing period. Three months following treatment, these subjects were smoking 15 cigarettes a day. The subjects in the other two groups had reduced an average of 7 cigarettes a day by the post-testing period. The monitor-control subjects had returned essentially to their pre-testing period rate by the follow-up period while the relaxation-group subjects were 3 cigarettes below their initial rate at follow-up. Reductions for these two groups, as mentioned earlier, were statistically insignificant.



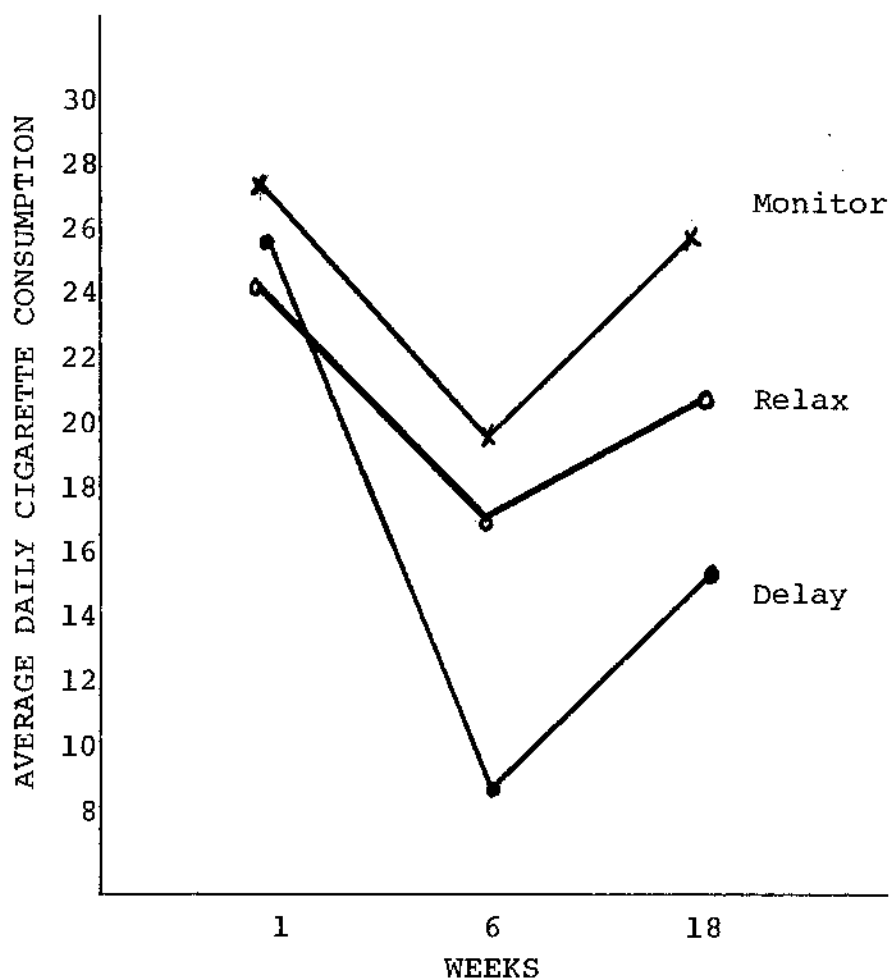


Figure 1. Average daily cigarette consumption by treatment weeks and follow-up for the three groups.

#### Other Comparisons

The number of subjects completing the study, reaching abstinence, and maintaining abstinence for each group is shown in Table 4. A X square analysis showed no significant difference on these three variables among the three groups (all  $\chi^2$ 's  $> .05$ ). Results of the two thiocyanate analyses of those who reported achieving abstinence prior to the last

Table 4

Number of Subjects Completing Program, Reaching Abstinence,  
and Maintaining Abstinence for the Three Groups

	Completed	Reached Abstinence	Maintained Abstinence
Delay (N=9)	8	3	2
Relax (N=9)	8	3	2
Monitor-Control (N=9)	9	3	1
Total (N=27)	25	9	5

treatment day are shown in Table 5. Results indicate that 3 of the 4 subjects who reported relapse at follow-up, had relapsed within 2 weeks following termination of treatment. The second thiocyanate analysis occurred 2 weeks following treatment termination, a period corresponding to the half-life of thiocyanate.

#### All Subjects

The intensity of the smoking habit has been found to be related to treatment success, with moderate or light smokers being more likely to reach or almost reach abstinence than heavy smokers (Schwartz & Dubitzky, 1968). Accordingly, subjects were categorized into light or moderate smokers (up to 29 cigarettes a day) and heavy smokers (30 or more cigarettes a day), based on estimated daily consumption to determine

Table 5  
Thiocyanate Analysis of Subjects who Reported Abstinence  
at Treatment Termination

Group	Age	Sex	Years Smoked	Estimated Daily		Analysis	
				Consumption	µgms/ml	1st Analysis	2nd Analysis
Delay	32	F	17	20	5.9	2.1	2.1
Delay	35	F	20	20	6.6	5.6*	5.6*
Delay	42	F	28	30	7.3	2.0	2.0
Relax	26	F	11	20	9.1	4.7	4.7
Relax	29	F	16	20	5.3	2.6	2.6
Relax	49	F	33	15	9.5	3.5	3.5
Monitor	33	F	17	30	9.6	6.1*	6.1*
Monitor	51	F	20	15	5.8	6.0*	6.0*
Monitor	60	F	40	30	9.8	4.1	4.1

\*Indicates relapse had occurred by the time of the second analysis.

whether a relationship existed between habit intensity and the occurrence of a 75% reduction and the maintenance of a 50% reduction. Results of this analysis are shown in Table 6. A  $\chi^2$  analysis of category of smoker compared to level of smoking reduction achieved revealed a significant difference in level of reduction achieved in favor of the light or moderate smoker ( $p < .01$ ). A  $\chi^2$  analysis comparing category of smoker to level of maintained reduction was insignificant ( $p > .05$ ). These results indicate that subjects whose estimated daily smoking rate was fewer than 30 cigarettes a day were more likely to reduce their intake by 75% or more, but were no more likely than heavy smokers to maintain a 50% reduction 3 months following treatment.

Table 6

Relationship between Intensity of Habit and Level  
of Reduction Achieved and Maintained

Category	Treatment*		Follow-up**	
	<.25	>.25	<.50	>.50
Light<30	9	1	6	4
Heavy>30	5	12	5	12

\* $\chi^2$  (with Yates correction)  $< .01$

\*\* $\chi^2 > .05$

To facilitate comparison with other studies, overall reduction and abstinence figures are presented in Table 7. Subjects reduced their cigarette consumption 50-60% during treatment with a 20% relapse from this level at follow-up. While 1/3 achieved abstinence, only 1/5 of those who started the program were abstinent at follow-up.

### Discussion

The present study provides support for the effectiveness of a self-imposed delay technique in the control of cigarette smoking behavior. Effectiveness is defined in the sense that it produces both immediate and durable results (Bernstein, 1969). The effectiveness of self-monitoring alone, or with a self-directed relaxation technique added to it, was not supported. However, the three techniques were comparable in their ability to hold subjects in treatment, to aid subjects in achieving complete abstinence, and to maintain abstinence once achieved.

The outcome pattern of the delay group is different from most of the patterns reported in the smoking-control literature in that a relapse effect is absent. A relapse effect is defined as a significant unfavorable change in the target behavior between termination of treatment and the end of the follow-up period. Thus, the findings of the present study offer qualified support for the hypothesis that self-managed change techniques are promising durability enhancing approaches to the treatment of addictive-like behaviors. The qualification

Table 7  
 Reduction and Abstinence Percentages at End of  
 Treatment and Follow-up for All Subjects

Source of Base rate	Reduction at end of Treatment (%)	Reduction at Follow-up (%)	Subject Total	Percent Abstinent End of Treatment	Percent Abstinent End of Follow-up
Estimated			Obtained Treatment		
Daily Rate	53	32	N=25	36	20
Monitored			Started Treatment		
Daily Rate	42	18	N=27	33	18

is required because both self-monitoring and self-directed relaxation failed to produce short-term change, rendering an evaluation of their durability meaningless.

The failure of relaxation training to effect significant change is contrary to expectations. Most smokers readily admit to smoking in response to experienced tension. Consequently, a procedure designed to provide an alternative to smoking for tension-management would be expected to produce significant change. A possible explanation for the present findings with respect to the failure of relaxation training is that the procedure was not implemented. This is a frequently suggested explanation in self-management studies where the implementation of the procedures is to take place in the natural environment (Mahoney & Thoreson, 1974). The same reasoning could be applied to suggest that the strategy to be implemented in the group in which expected change took place was not in fact utilized. It has been suggested that implementation of the procedures must be verified to rule in or to rule out these possibilities. It is argued here that implementation should be assumed to follow instructions to implement in the absence of a subject's report to the contrary, and that a failure to produce change should not be taken as a sign that implementation did not occur. Self-management techniques were developed from Skinner's (1953) theoretical statements on self-control. Self-control theory suggests control will occur when a response is effective in controlling

a response to-be-controlled. If self-control does not occur, the technique designed to generate the controlling response or the controlling response is assumed ineffective. In the present case, either the relaxation technique or the relaxation response would be viewed ineffective. Since three subjects using this procedure reached abstinence, an explanation which allows for differential effectiveness of the relaxation response for the treatment of cigarette smoking would be most in accord with the data. Tomkins (1966) has theorized that the "key to the understanding of smoking behavior is to be found in the management of affect." Tomkins goes on to suggest that there are several types of smokers, each type determined by the nature of the affect smoking is effective in managing. For the purposes under discussion, two of Tomkins' types are most relevant and have received the most empirical verification: the positive affect smoker and negative affect smoker (Ikard & Tomkins, 1972). A positive-affect smoker smokes mainly to accentuate or evoke positive feelings. Negative-affect smokers, on the other hand, smoke to alleviate negative feelings. Relaxation training would be ineffective for the former and effective for the latter type of smoker as a substitute or alternative response. No systematic data were taken on types of smokers in the present study. However, several subjects in all groups reported that they smoked when feeling positive and not in response to anxiety, depression, or sadness. This analysis suggests that



negative-affect smokers were assisted in controlling their cigarette smoking by the relaxation training, whereas the positive affect smokers were not.

The failure of self-monitoring alone to achieve significant reduction in cigarette smoking is also contrary to expectations and inconsistent with the findings of other investigators, most notably McFall and Hammen (1971). A major procedural difference may account for the inconsistency of the present findings with the McFall and Hammen study. In the present study, subjects self-monitored for a 6-week period, whereas the experimental period for the McFall and Hammen study was 3 weeks. Several investigators have confirmed the temporary nature of the reactivity of self-monitoring (Broden, Hall, & Mitts, 1971; Johnson & White, 1971).

The delay technique would not be expected to be differentially effective for types of smokers. The instructions presented were to delay a response to an impulse to smoke, regardless of the subjective circumstance associated with the impulse, and in whatever way possible. Ackerman (1972, 1973) has demonstrated that an interruption of the occurrence of a consummatory response to an urge or impulse will result in the relatively rapid extinction of the impulse. The difficulty is that if the consummatory response occurs the frequency of occurrence of the impulse quickly returns to its former level (Solomon & Corbit, 1973). The delay procedure,

however, was designed to disassociate the consummatory response from the impulse. In other words, a subject detected an urge to smoke, engaged the timing device and smoked, if at all, to the sound of the timer and not to the detection of an impulse. The foregoing is offered as an explanation of the attenuated relapse effect for subjects in the delay-group who were less likely to relapse because the frequency of impulses to smoke was diminished by the procedure. In the self-monitoring and in the relaxation group, smoking continued its association with an urge. Non-specific factors, at least for self-monitoring and probably also for relaxation, accounted for the small reductions that occurred during the active treatment period. When structured participation and experimenter attention were withdrawn, the mechanisms accounting for the reductions were no longer operating and the behavior returned to its former level.

An alternative explanation for the delay procedure's durability relates to the effect of smoking to a clearly audible timing device. It is likely that subjects in the delay-group communicated their quit attempt more extensively by virtue of the timing device than did subjects in the other groups. In other words, the timing device announced their effort and programmed an increased likelihood of social punishment for failure to continue the reduction effort. Punishment procedures have been demonstrated to be most effective in temporarily reducing cigarette consumption

(Lichtenstein, Harris, Birchler, Wahl, & Schmahl, 1973; Schmahl, Lichtenstein, & Harris, 1972). However, with a self-management paradigm, the problem has been that a procedure aversive enough to affect the behavior is too aversive to be implemented by the cigarette smoker without external control. The delay-group procedure programmed future aversive consequences; hence, the probability of implementation was less affected by the aversiveness of the procedure than would be the case for immediately aversive techniques, such as portable electric shock mechanisms (Azrin & Powell, 1968). However, most subjects reported eventual difficulty with allowing the device to sound in a public place. At this point, they either quit altogether or reduced their smoking in public, but by this time their attempt had wide publicity.

The present procedure's impact on smoking behavior compares favorably in some respects and unfavorably with other reports in the literature. The McFall and Hammen review of 13 studies reported an average 60-70% reduction from base rate smoking compared to the 40-50% obtained in the present study. Reductions at follow-up are equivalent. In the McFall and Hammen review, 26% of the subjects achieved abstinence and 50% of these relapsed within 6 months compared in the present study to 36% abstinence with 45% of these relapsing within 3 months. Hunt and Matarazzo (1973) as well as Hunt and Bospalec (1974) in a summary of 186 studies indicate that the average return to smoking of those achieving abstinence is

about 75% within 3 to 6 months, with a considerable proportion of these relapses occurring within 2 weeks of treatment termination.

Self-imposed delay in particular and the general strategy of the present study may be a useful method to deal with the relapse problem associated with the abusive use of substances. It does appear that certain treatment techniques are more durable than others but this does not suggest that direct efforts to isolate independent maintenance variables should be discouraged.

A task for treatment and research suggested by the present study is to determine the effectiveness of a delay-technique instigated earlier in the chain of smoking behavior. Implementing the technique at progressively earlier links in the smoking chain between the purchase and consumption of a cigarette may be more effective than a time extension. The effect of specifying an activity or activities to fill the delay interval is open to question. It is unlikely that subjects do nothing during delay. Kanfer and Seidner (1972) have shown that distracting tasks enhance tolerance of noxious stimulation and certain activities may facilitate delaying to an urge to smoke a cigarette.

A major implication of the present study derives more from what it did not accomplish than from any positive finding. Different mechanisms may maintain smoking in different individuals. In the present study, it was assumed that anxiety

was an active maintenance-of-smoking mechanism for all smokers. The findings suggest otherwise. It may be that individuals will smoke in response to negative affect, but that the loss of a method of evoking positive affect is more critical in the maintenance of non-smoking.

## Appendix A

## Smoking Withdrawal Program Application

Name \_\_\_\_\_ Age \_\_\_\_\_

Sex \_\_\_\_\_ Marital Status \_\_\_\_\_ Telephone \_\_\_\_\_

Address \_\_\_\_\_

Work Address \_\_\_\_\_ Dept. \_\_\_\_\_

Hours: From \_\_\_\_\_ To \_\_\_\_\_ Days per Week \_\_\_\_\_

Work Telephone \_\_\_\_\_ Ext. \_\_\_\_\_

1. How many years have you been smoking? \_\_\_\_\_
2. Approximately how many cigarettes do you smoke per day? \_\_\_\_\_
3. Approximately what time of the day do you have your first cigarette? \_\_\_\_\_ your last? \_\_\_\_\_
4. Have you tried to quit before? \_\_\_\_\_
5. If yes, how many times? \_\_\_\_\_ longest period of abstinence? \_\_\_\_\_
6. If married, does your spouse smoke? \_\_\_\_\_
7. Did either of your parents smoke? \_\_\_\_\_
8. Rank your expectation for a successful quit attempt on this occasion, with 1 meaning "no chance" and 5 meaning the best possible chance. \_\_\_\_\_

Do Not Write Below

1. Group assignment \_\_\_\_\_

2. Deposit received \_\_\_\_\_

3. ID number \_\_\_\_\_
  4. Informed consent signed \_\_\_\_\_
  5. Blood sample procedure initiated \_\_\_\_\_
  6. Appointment dates: \_\_\_\_\_
-

Appendix B  
Informed Consent Agreement

I, \_\_\_\_\_, do hereby consent to participate in an experimental treatment procedure aimed at decreasing my cigarette smoking behavior. I understand that participation will span a 6 week period, with a follow-up meeting scheduled for three months after the completion of the 6 weekly sessions. I understand that my implementation of experimental procedures outside the experimental setting will be observed by parties unknown to me from time to time during the 6 week period.

I understand that I will be randomly assigned to one of (three) groups of subjects with the following experimental procedures:

(1) a procedure involving a planned delay between an urge to smoke and a response to the urge.

(2) a procedure involving substituting a response for a smoking response.

(3) a procedure involving the self-monitoring of my smoking behavior.

I further understand that a chemical analysis of my blood serum will be used to corroborate my cigarette smoking behavior reports. The chemical analysis may require two blood samples drawn from me via venipuncture, one at the



beginning of the experimental procedure and the other at the end of the procedure.

I understand that although the experimental procedures are designed to have therapeutic effects, no guarantee of this is made.

My decision to participate or not to participate will have no effect on the availability of services to me of the Veterans' Hospital or the Medical University nor will my employment by either of these facilities be affected in any way by my decision.

I understand that I am free to withdraw my consent and discontinue participation at any time, but in order to regain by deposit I must at the time of withdrawal return all equipment, turn in the data I have collected on myself up to that point, and provide information about my smoking behavior during the follow-up period.

---

Signature of Consentee

---

Date

---

Signature of Interviewer

---

Date

## Appendix C

### Self-Imposed Delay

Rationale. Once the cigarette smoking response is firmly established, it proceeds primarily as a response to an impulse. An impulse is experienced as a vague feeling of wanting to do something. Cigarette smokers have learned to respond to this subjective state by cigarette smoking. Many other responses are possible. Since impulses quickly dissipate, one possible response is to delay responding to the impulse. Another class of possible responses is to do something else. The self-imposed delay procedure accomplishes two things: (a) it allows for non-reinforcement of the impulse, hence leading to a reduction in frequency of occurrence and (b) it allows for trying out alternative responses hence leading to an association between an impulse and a new behavior incompatible with cigarette smoking.

#### Procedure.

1. Baseline. Count each cigarette smoked at the time of consumption using counter provided. Transfer daily total to chart in file folder. Make no attempt to control tobacco intake.

2. Beginning with 2nd week, using timing device provided, let detection of a cigarette urge serve as a cue to set the timer to a 5 minute interval. Refrain from having a cigarette until the timer sounds. Continue for one week. Continue monitoring also as during baseline.

a. Do not set timer unless you are in a situation in which you are free to smoke. For example, if you are in a meeting in which smoking is forbidden, do not set the timer until an urge occurs after the meeting is over. Do not anticipate urges!!!

b. Between the urge to smoke and the sound of the timer indicating smoking can occur is the period within which maximum learning should take place. It is during this interval that alternative behaviors should be "tried out."

3. Beginning with the 3rd week, extend interval to ten minutes. Continue for one week. Continue counting and recording as before. Continue learning

- a. that you need not smoke to an urge and
- b. that you can do something else.

4. Beginning with 4th week, extend interval to 15 minutes. Continue as before with monitoring and "learning."

5. Do not use the timer during the 5th week. Attempt to control consumption using a delay you are comfortable with. Continue monitoring.

6. During week 6, attempt to refrain from all tobacco intake utilizing learning that has taken place over preceding weeks. At final meeting, at end of week 6, turn in smoking records and equipment, and arrange for follow-up.

## Appendix D

## Self-Relaxation (Group 2)

Rationale. Cigarette smoking is a response to tension or other uncomfortable feelings for many people. The self-relaxation procedure involves learning to substitute a tension reducing response for the cigarette smoking response.

## Procedure.

1. Baseline. Count each cigarette consumed using the counter provided. Transfer daily total to the chart in the file folder provided. Continue counting for one week. Make no attempt to control smoking behavior.

2. Beginning with second week, after receiving instructions for self-relaxation, practice complete relaxation once each day for approximately 15 minutes. Also, begin letting a detection of an urge to smoke serve as a cue to engage in the abbreviated relaxation procedure. Continue counting each cigarette consumed and transferring daily total to your chart.

3. At sessions 3, 4, and 5, the full-relaxation procedure will be practiced as well as the shortened version. During weeks 3, 4, and 5 continue practicing the full relaxation procedure at home once each day and continue monitoring cigarette consumption.

4. During the 6th week make every attempt to refrain from all tobacco intake. Extend the abbreviated relaxation procedure if necessary.

5. At the end of week 6, turn in counter and smoking record and receive information for the follow-up procedure.

## Appendix E

### Full Relaxation Training

The first muscle group that we are going to focus on are the muscles of your hands and arms. I want you to begin now to slowly form your fingers into two tight fists. Feel the tension as you do it. Make them as tight as you can.

As you do this I want you to raise your hands up toward your shoulders as though you are forming two muscles. Feel the tension, feel how taut your fingers are. Hold it as tight as you can bear it. . . . Now relax, let your hands fall back to the chair. Relax your fingers . . . relax your forearms . . . let the tension leave your hands . . . let your hands sink into the arms of the chair . . . concentrate on relaxing these muscles . . . relax your fingers . . . let your fingers be gently curled . . . relax your upper arm . . . concentrate on relaxing the whole length of your arm . . . as you relax deeper you can feel the warmth spreading in your fingers; as you relax further the warmth will spread up your arms. . . .

Now what I want you to do is to raise your hands about an inch above the arms of the chair, stretching them out in front of you, making the muscles of your arms and your fingers as taut as you can. Stretch your whole arm out in front of you. Hold it as tight as you can, feel the tension in the fingers and in your wrists. Now relax, let your hands fall

back to the arms of the chair. . . . Let your arms be supported on the arms of the chair. Relax your fingers . . . let them sink into the chair . . . relax your wrists . . . let all the tension leave your forearms . . . as you relax, your fingers should be gently curled . . . just concentrate on relaxing your arms . . . let all the tension leave the muscles of the fingers and your arms. . . .

Now I am going to ask you to repeat the exercise again. I want you now to form your fingers into a tight fist. As you do this begin bringing your hands up toward your shoulders tensing all the muscles concentrating on the muscles that you are tensing, feeling the sensation of tenseness. Now hold it as tight as you can . . . now relax, let your arms fall back to the arms of the chair . . . let the tension leave your hands, relax your fingers, relax your wrists . . . you can feel the warm feeling, the tingling in your fingers. Concentrate on relaxing them further . . . relax your forearm, let the whole length of your arm relax. . . . Now I want you to raise your hands and your arms about an inch above the chair, stretching them out as taut as you can. Spread your fingers holding them as rigid and as tight as you can. Feel the sensation in the muscles you are using. Now relax and let your hands fall to the chair . . . let your arms rest on the arms of the chair. I want you to concentrate on relaxing your fingers . . . let all the strain leave your arms and hands . . . relax them further. . . .

Now the next muscle groups we are going to work with are the muscles of your legs and your feet. . . . Now I want you to close your eyes and concentrate on the instructions that I am giving you. I want you to begin by pointing your toes up toward your face. As you do this you should tense the whole length of your leg, your ankles, your arches, and your calves. Hold it as tight as you can. . . . Now I want you to begin to point your toes in the opposite direction. Feel the tension in your toes, in the soles of your feet, in your ankles, and in your thighs. Hold it as tight as you can. . . . Now relax . . . as you relax let your feet fall apart, relax your ankles . . . relax your toes . . . let all the tension leave your legs. Let your legs sink into the chair. Relax your calves . . . relax the whole length of your leg . . . concentrate on relaxing the soles of your feet, relax the toes. Concentrate on my voice and on relaxing the muscles of your legs . . . relax them further. . . . Now I am going to ask you to repeat the tensing and the relaxing of your legs again. I want you to begin now by pointing your toes up toward your face, feel the tension, feel how rigid your legs are. Hold it. . . . Now begin to point your toes away from your body . . . make your legs as rigid as you can stand it . . . now relax . . . let your heels sink into the chair, let your feet gently fall apart . . . concentrate on letting all the strain and all the tension out of the muscles



of your legs . . . relax your toes, relax your ankles . . .  
let your calves sink into the chair . . . let your legs  
become heavy and comfortable . . . relax them further. . . .

Now the next muscle group that we are going to focus our attention on are the muscles of your neck. I want you to begin by pushing your chin into your chest. Now as you do this feel the tension in the back of your neck. Push your chin down as far as you can stand it. Now hold it; now I want you to begin to lift your chin up and push your head back into the chair feeling the tension in the front of your neck. Jut your chin out as far as you can. Feel the change in the muscles with the tension that you are creating, hold it, now relax . . . relax the tension in your neck muscles, imagine your head is like a ball that's not at all attached to your body. You feel no sensation, no strain at all in your neck . . . relax the muscles further . . . concentrate on removing all stress and all strain from the area of your neck. When you are tense, when you are anxious, the first place it shows is in the muscles of your face. Now I want to begin to focus on your facial muscles, begin by squeezing your face together as tight as you can stand it, hold it. . . . Now relax . . . now what I want you to do is to squeeze your eyes as tight as you can, not your forehead, not your nose, just your eyes, hold it as tight as you can. Now relax . . . I want you to frown. I want you to put in

all the displeasure that you've ever felt in it. A good frown will bring your eyebrows close together. Frown as hard as you can, hold it. Now relax. . . . Now I want you to squeeze your nose together as though you are smelling a particularly unpleasant odor, hold it. . . . Relax. . . . Now the next facial muscles are difficult to relax, these are the squeezing out of your cheeks. Begin by starting to smile, tighten the smile, I mean force out your cheeks . . . hold it. Now relax. . . . Now I want you to round out your lips as though you are pursing in a kiss, keep your teeth slightly apart. Now relax. . . . Sigh deeply and sigh loudly. . . . As you sigh you can feel your neck muscles and your shoulder muscles relaxing. Now relax your forehead, remove all the wrinkles from your face . . . concentrate on relaxing. . . . With your mouth open gently relax your jaws. . . . Relax your facial muscles further . . . let all the stress and all the strain leave your mind . . . relax your forehead further. . . . When you tense the muscles of your face in this exercise your face will slightly flush, this is good, this is a healthy flush, it will clear up in a few minutes, however, the feeling of relaxation will not. In order to achieve complete relaxation it is important to learn to control your breathing. I would like you now to place your hands on your stomach. As you breathe I want you to feel the rise and fall of your hands. And when I tell you to, I want you to take a deep breath and hold it. . . . Take

a deep breath and hold it. . . . Feel the tension in your stomach, now relax with a sigh. . . . You can feel your stomach relaxing . . . you can feel the sensation within the pit of your stomach as you relax. . . . Relax your stomach muscles further. . . . You may put your arms back on the arms of the chair. . . . Now take another deep breath and hold it . . . now relax with a sigh . . . let your breathing be very slow and very comfortable. . . . With each breath I want you to let out the tension and the strain within your body. . . . Concentrate on the rhythm of your breathing. Let your stomach muscles relax further. With each breath you can feel yourself relaxing further. . . . Now relax your body, let your body sink into the chair . . . relax your arms . . . relax your mouth . . . let all the tension leave your legs . . . relax your fingers. As you relax you can feel the warmth spreading throughout your body, let the pleasant feeling spread. Let your arms sink into the chair. Let your breathing be very comfortable and very relaxed. . . . With each breath you will feel more and more relaxed. Relax your forehead, let all your worries and all the daily strain leave with each breath you take . . . let your whole body relax further. . . .

Now I am going to present a scene for you to visualize. I want you to imagine the scene as though it were taking place right at this very moment. I want you to see everything as though it were happening right now. You will see and you will hear everything. I want you to imagine now that it is a warm

spring day . . . you are out in the country . . . the flowers are all blooming. . . . You are lying on the soft grass. . . . It is very green and very comfortable. . . . Nearby is a small stream and the water is flowing very gently. . . . You can hear it bubbling as it flows. . . . The sun is beating down and the sky is blue. . . . Now I want you to stop visualizing the scene. Let the scene pass. Let your body relax. Concentrate on relaxing your arms. Relax your mouth, relax your breathing, relax your jaw. Let all the tension leave your hands and your legs. Look into the darkness of your eyes and relax. . . . Let your mouth open gently as you relax . . . let the warm feeling spread over your body, concentrate on relaxing. . . . (2 minutes of undisturbed relaxation.)

Now when I count three I want you to open your eyes feeling very relaxed, very calm and very refreshed. One . . . two . . . three! Now you can stretch, but again make no noise or no comment. . . .

Now it is very important that between sessions you practice the exercise that you learned today. . . . You should find a quiet spot where you can practice each day for about 15 minutes at a time. You will find that if you practice at night you may learn to fall asleep more rapidly.

## Appendix F

## Abbreviated Self-Relaxation

1. Try to imagine total body feeling which occurs at end of full relaxation procedure.
2. Take two deep breaths.
3. Tense and relax jaw muscles. Repeat.
4. Take two deep breaths.
5. Tense and relax forearm and upper arm muscles of both arms. Repeat.
6. Take two deep breaths.

## Appendix G

## Self-Monitoring (Group 3)

Rationale. Cigarette smoking is an over-learned habit and as such takes place with almost no awareness on the part of the smoker. Eliminating the habit requires that the smoker becomes aware of the behavior. Once the behavior is "conscious," individual smokers can learn on their own to control the behavior.

## Procedure.

1. Baseline. Count each cigarette consumed at the time of consumption using counter provided. Transfer daily total to chart in file folder. Continue counting for one week. Make no attempt to control your smoking behavior during this week.

2. Continue for 4 additional weeks with monitoring procedure as during baseline week. Begin to attempt to reduce tobacco intake "on your own." Meet with experimenter at end of each of these weeks to report smoking frequency.

3. At the beginning of the 6th week, make every attempt to refrain from all tobacco intake if abstinence has not already occurred.

4. At the end of week 6, turn in counter and smoking record and receive information about follow-up procedure.

## Appendix H

Dear Smoking Research Participant:

It has been three months since you completed the smoking control program.

I would like to know how many cigarettes, if any, you are presently smoking each day.

Please count your daily consumption for one week and return the average number to me recorded on this letter in the enclosed envelope.

Thank you for your participation and cooperation.

Sincerely,

Paul W. Taylor

-----  
Average daily consumption \_\_\_\_\_.

Signature \_\_\_\_\_.

## References

- Ackerman, P. D. Extinction of covert impulse responses through elimination of consummatory events. The Psychological Record, 1972, 22, 477-486.
- Ackerman, P. D. Formulations regarding an experimental analysis of covert impulse and depression responses as mediators of consummatory S-R sequences. The Psychological Record, 1973, 23, 477-486.
- Astrup, P. Carbon monoxide and peripheral arterial disease. Scandinavian Journal of Clinical Laboratory Investigations, 1967, 19, 193.
- Azrin, N. H. & Powell, J. Behavioral engineering: the reduction of smoking behavior by a conditioning apparatus and procedure. Journal of Applied Behavior Analysis, 1968, 1, 193-200.
- Bandura A. & Perloff, B. Relative efficacy of self-monitored and externally imposed reinforcement systems. Journal of Personality and Social Psychology, 1967, 7, 111-116.
- Bernstein, D. A. Modification of smoking behavior: an evaluative review. Psychological Bulletin, 1969, 71, 418-440.
- Bernstein, D. A. The modification of smoking behavior: a search for effective variables. Behavior Research and Therapy, 1970, 8, 133-146.



- Best, J. A. Tailoring smoking withdrawal procedures to personality and motivational differences. Journal of Consulting and Clinical Psychology, 1975, 43, 1-8.
- Best, J. A. & Steffy, R. A. Smoking modification tailored to subject characteristics. Behavior Therapy, 1971, 2, 177-191.
- Bourne, P. G. & Fox, R. (Eds.). Alcoholism: progress in research and treatment. New York: Academic Press, 1973.
- Broden, B., Hall, R. V., & Mitts, B. The effect of self-monitoring. Journal of Applied Behavioral Analysis, 1971, 4, 191-199.
- Butts, W. C., Kuehneman, M., & Widdowson, G. M. Automated method for determining serum thiocyanate to distinguish smokers from non-smokers. Clinical Chemistry, 1974, 20, 1344-1348.
- Callner, Dale A. Behavior treatment approaches to drug abuse: a critical review of the research. Psychological Bulletin, 1975, 82, 143-164.
- Chapman, R. F., Smith, J. W., & Layden, T. A. Elimination of cigarette smoking by punishment and self-management training. Behavior Research and Therapy, 1971, 9, 155-164.
- Dastur, D. K., Quadras, E. V., & Wadia, N. H. Effects of vegetarianism and smoking on vitamin B<sub>12</sub>, thiocyanate, and folate levels in the blood of normal subjects. British Medical Journal, 1942, 3, 260.

- Delarue, N. C. A study of smoking withdrawal. Canadian Journal of Public Health, Supplement, 1973, 64.
- DeLeon, G. Phoenix house therapeutic community: the influence of time in program on change in resident drug addicts. Proceedings of the 81st Annual Convention of the American Psychological Association, 1973, 8, 399-400.  
(Summary)
- Densen, P. M., Davison, B., Bass, H. E., & Jongs, E. W. A chemical test for smoking exposure. Archives of Environmental Health, 1967, 14, 285.
- Elliott, R. & Tighe, T. Breaking the cigarette habit: effects of a technique involving threatened loss of money. Psychological Record, 1968, 18, 503-513.
- Frederiksen, L. W. & Peterson, G. L. Development and maintenance of controlled smoking by two procedures. Paper presented at the meeting of the Southeastern Psychological Association, Atlanta, 1975.
- Glatt, M. M. Today's enjoyment--tomorrow's dependency: the road towards the rock-bottom and the way back. British Journal of Addictions, 1975, 70, 25-34
- Glynn, E. L. Classroom applications of self-determined reinforcement. Journal of Applied Behavior Analysis, 1970, 3, 123-132.
- Goldfarb, C. & Hartman, B. A total community approach to the treatment of alcoholism. Disease of the Nervous System, 1975, 36, 409-414.

- Goldsmith, J. R. & Landsan, S. A. Carbon monoxide and human health, Science, 1968, 162, 1352.
- Hall, M. Self-control and therapist control in the behavioral treatment of overweight women. Behavior Research and Therapy, 1972, 10, 59-68.
- Hall, S. M. & Hall, R. G. Outcome and methodological considerations in behavioral treatment of obesity. Behavior Therapy, 1974, 5, 352-364.
- Hall, S., Hall, R., Borden, B., & Hanson R. Follow-up strategies in the behavioral treatment of overweight. Behavior Research and Therapy, 1975, 13, 167-172.
- Harris, M. B. & Bruner, C. G. A comparison of a self-control and a contract procedure for weight control. Behavior Research and Therapy, 1971, 9, 345-354.
- Hunt, W. & Bepalec, D. An evaluation of current methods of modifying smoking behavior. Journal of Clinical Psychology, 1974, 30, 431-437.
- Hunt, W. & Matarazzo, J. Three years later: recent developments in the experimental modification of smoking behavior. Journal of Abnormal Psychology, 1973, 81, 107-114.
- Ikard, F. F. & Tomkins, S. The experience of affect as a determinant of smoking behavior: a series of validity studies. Journal of Abnormal Psychology, 1973, 81, 172-181.
- Jacobson, E. Progressive relaxation. Chicago: University of Chicago Press, 1938.

- Jeffrey, D. B. Self-control: methodological issues and research trends. In M. Mahoney & C. Thoresen (Eds.), Self-Control: power to the person, 1974, 166-199.
- Johnson, S. M. & Martin, S. Developing self-evaluation as a conditioned reinforcer. In B. Ashem and E. G. Poser (Eds.), Behavior modification with children. New York: Pergamon, 1975.
- Johnson, S. & White, G. Self-observation as an agent of behavioral change. Behavior Therapy, 1971, 488-497.
- Kanfer, F. H. Self-monitoring: methodological limitations and clinical applications. Journal of Consulting and Clinical Psychology, 1970, 35, 148-152.
- Kanfer, F. H. Self-regulation research, issues, and speculations. In M. Goldfried and M. Merbaum (Eds.), Behavior change through self-control. New York: Holt, Rinehart, and Winston, Inc., 1973.
- Kanfer, F. H. & Duerfeldt, P. H. Comparison of self-reward and self-criticism as a function of types of prior external reinforcement. Journal of Personality and Social Psychology, 1968, 8, 261-268.
- Kanfer, F. H. & Karoly, P. Self-control: a behavioristic excursion into the lions den. Behavior Therapy, 1970, 3, 398-416.
- Kanfer, F. H. & Seidner, M. L. Self-control: factors enhancing tolerance of noxious stimulation. Journal of Personality and Social Psychology, 1972, 39, 370-380.

- Keutzer, C. A. Behavior modification of smoking: the experimental investigation of diverse techniques. Behavior Research and Therapy, 1968, 6, 137-157.
- Lewis, M. J., Bland, R. C., & Baile, W. Disulfiram implantation for alcoholism. Canadian Psychiatric Association Journal, 1975, 20, 283-286.
- Lichtenstein, E., Harris, D. E., Birchler, G. R., Wahl, J. H., & Schmahl, D. O. A comparison of rapid smoking, warm, smokey air, and attention placebo in the modification of smoking behavior. Journal of Consulting and Clinical Psychology, 1973, 40, 92-98.
- Lindsley, O. R. A reliable wrist counter for recording behavior rates. Journal of Applied Behavior Analysis, 1968, 1, 77-78.
- Lopato, D. & William, J. L. Self-control: a critical review and an alternative interpretation. The Psychological Record, 1976, 26, 3-12.
- Lovitt, T. C. & Curtiss, K. Academic response rate as a function of teacher and self-imposed contingencies. Journal of Applied Behavior Analysis, 1969, 2, 49-53.
- Mahoney, M. J. Research issues in self-management. Behavior Therapy, 1972, 3, 45-63.
- Mahoney, M. J. & Thoresen, C. E. Self-control: power to the person. Monterey, California: Brooks-Cole Publishing Co., 1974.

- Mahoney, M. J., Moura, N., & Wade, T. C. Relative efficacy of self-reward, self-punishment, and self-monitoring techniques for weight loss. Journal of Consulting and Clinical Psychology, 1973, 40, 404-407.
- Mahoney, M. J. Self-reward and self-monitoring techniques for weight control. Behavior Therapy, 1974, 5, 48-57.
- Mahoney, M. J. Toward an experimental analysis of covert control. Behavior Therapy, 1970, 1, 510-521.
- Maliszewski, T. F. & Bass, D. E. True and apparent thiocyanate in body fluids of smokers and non-smokers. Journal of Applied Psychology, 1955, 8, 289.
- McFall, R. M. & Hammen, C. L. Motivation, structure and self-monitoring. Journal of Applied Behavior Analysis, 1971, 4, 191-199.
- Meyer, R. G. Delay therapy: two case reports. Behavior Therapy, 1973, 4, 709-711.
- Pettigrew, A. R. & Fell, G. S. Simplified calorimetric determination of thiocyanate in biological fluids and its application to the investigation of toxic amblyopia. Clinical Chemistry, 1972, 18, 996.
- Schmahl, D. P., Lichtenstein, E., & Harris, D. E. Successful treatment of habitual smokers with warm smokey air and rapid smoking. Journal of Consulting and Clinical Psychology, 1972, 38, 105-111.

- Schwartz, J. L. & Dubitzky, M. Changes in anxiety, mood, and self-esteem resulting from an attempt to stop smoking. American Journal of Psychiatry, 1968, 124, 138-142.
- Skinner, B. F. Science and human behavior. New York: Macmillan Co., 1953.
- Solomon, R. L. and Corbit, John D. An opponent-process theory of motivation. Journal of Abnormal Psychology, 1973, 81, 158-171.
- Sutherland, A., Amit, Z., Golden, M., & Roseberger, Z. Comparison of three behavioral techniques in the modification of smoking behavior. Journal of Consulting and Clinical Psychology, 1975, 43, 443-447.
- Thoresen, C. E. & Mahoney, M. J. Behavioral self-control. New York: Holt, Rinehart and Winston, Inc., 1974.
- Tomkins, S. Psychological model for smoking behavior. American Journal of Public Health, 1966, 56, 17-27.
- Vogler, R. E., Lunde, S. E., Johnson, G. R., & Martin, P. L. Electrical aversion conditioning with chronic alcoholics. Journal of Consulting and Clinical Psychology, 1970, 34, 302-307.
- Vogler, R. E., Lunde, S. E., & Martin, P. L. Electrical aversion conditioning with chronic alcoholics: follow-up and suggestions for research. Journal of Consulting and Clinical Psychology, 1971, 36, 450.

- Wagner, M. K. & Bragg, R. A. Comparing habit-decrement smoking. Journal of Consulting and Clinical Psychology, 1970, 34, 258-263.
- Wilson, J. & Matthews, D. M. Metabolic interrelationships between cyanide, thiocyanate and vitamin B<sub>12</sub> in smokers and non-smokers. Clinical Science, 1966, 1, 31.
- Winer, B. J. Statistical principles in experimental design. New York: McGraw-Hill, 1962.