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PROCEDURES.**

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SMOKING MODIFICATION: THE EFFECTS OF COMBINING
POSITIVE AND AVERSIVE TREATMENT AND
MAINTENANCE PROCEDURES

by

Richard W. St. Pierre

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This study was concerned with the effects of several combinations of positive and negative treatment and maintenance procedures on the smoking level of subjects. Forty-seven subjects were assigned randomly to either a positive treatment, aversive treatment or no treatment control group.

Subjects in the positive treatment group met four times during a two-week period. Each session lasted approximately 50 minutes. Subjects were requested to keep a diary of their smoking behavior and record the situations most conducive to smoking. Self-control procedures designed to reduce smoking in high probability situations were discussed. Subjects were paired for the purpose of peer reinforcement. Both members of the pair were encouraged to provide assistance for each other during the treatment phase of the study. Lists of positive outcomes associated with nonsmoking were to be read prior to engaging in some high probability behavior. A total of twelve statements was provided. Subjects were advised to divide their waking hours into quarters and reduce smoking level during the quarter most conducive to smoking. Smoking during subsequent quarters was to be reduced during the study.

Subjects assigned to the aversive treatment group met four times over a two-week period. Emphasis was placed on

the adverse consequences of smoking. Films, filmstrips, and written material designed to provide information detailing the negative aspects associated with smoking were utilized. Subjects engaged in a role-playing situation designed to dramatize the negative consequences of smoking. Also, subjects were encouraged to make a list of the adverse effects associated with smoking and read the list prior to engaging in an activity conducive to smoking. Subjects were instructed to "visualize" a scene from the films or filmstrips prior to smoking. This was an attempt to personalize the threat of adverse consequences associated with smoking. If the subject actually smoked a cigarette he was to concentrate on the negative physical symptoms he experienced.

Following the treatment phase of the study subjects were assigned to either positive maintenance, aversive maintenance, or no maintenance control groups. The positive maintenance group met for two additional sessions and employed many of the techniques used with the positive treatment group. The aversive maintenance group met for two sessions and utilized the same procedures as the aversive treatment group. The no maintenance control group did not meet during this phase of the study.

Data used in the analysis of results were collected at four points during the study: prior to treatment, following treatment, following maintenance and three months after

treatment. Subject self-report of smoking level was the primary source of data. Reliability checks were made between subject report and the report of an informant. These checks revealed that the subjects' reports were highly reliable at all four data points.

A one way analysis of variance using percentage of smoking reduction from baseline yielded significant results at the posttreatment data point. Newman-Keuls post hoc interpretations found the positive treatment group superior to the no treatment control group following treatment.

A 3 x 3 x 4 analysis of variance (Treatment x Maintenance x Time) was computed using daily level of smoking as the dependent measure. No interaction effects emerged from the analysis. However, main effects of both maintenance and time of measurement were shown. The positive maintenance procedures proved significantly more effective than no maintenance when all subject smoking reports were averaged across all data points. There was a significant reduction in smoking level across all groups after baseline. Both the positive and aversive treatment groups reduced their smoking by nearly 50% at the end of treatment and this reduction continued throughout the maintenance and follow-up phases of the study. The fact that the smoking rates did remain stable over three months supports the efficacy of applying maintenance procedures to enhance long term smoking reduction.

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CHAPTER I

INTRODUCTION

Problem Area

Cigarette smoking has received considerable attention as a significant health hazard since the Surgeon General's statement was issued in 1964. Although the percentage of smokers has declined slightly since then, the number of smokers continues to grow.

From the early twenties to 1970 consumption of cigarettes in the United States rose from 750 (37 1/2 packs) per adult (15 years or older) to 3970 (198 1/2 packs) per adult per year (Fitch, Elliot, & Johnson, 1973, p. 378). The Department of Agriculture estimates some 70 million Americans smoke cigarettes on a regular basis. Except for a few remaining skeptics, scientists have concluded that smoking is harmful to physical health. Yet about half the adult males and one third of the adult females in the country continue to smoke (Mausner & Platt, 1971, p. 1).

The continuous rise in cigarette consumption, along with the well-publicized apparent health-related negative consequences of cigarette smoking have resulted in a large increase of studies developed to explore the feasibility of various techniques and approaches designed to modify smoking

behavior. Bernstein (1969) has stated that the emphasis on smoking modification started during the early sixties. Prior to 1962 the vast majority of smoking research attempted to analyze the psychological or morphological characteristics of smokers.

Many individuals concerned with maintaining a high level of health have attempted to control their smoking. A variety of methods and techniques to reduce or stop smoking behavior have been developed. Unfortunately, the success rate of such programs has been modest (Ferraro, 1973). This may be attributed to two factors: (1) the treatment of smoking behavior involves removing previously well established behavior patterns and replacing them with alternative patterns; and (2) the daily occurrence of social cues which encourage the smoker to smoke. The preliminary selection of subjects in smoking behavior modification programs usually includes only those subjects who are motivated to stop smoking. This further detracts from the modest results reported. Two thirds of those who stop smoking during the various studies which report success resume smoking within three months. Furthermore, only one fourth of that number remain nonsmokers for any considerable length of time (Hunt & Matarazzo, 1973, p. 108).

Many investigators consider smoking a specific form of behavior disorder which can be treated by techniques

designed to eliminate the undesired behavior. Techniques designed to reduce smoking are usually based on stimulus-response learning theory. These investigators believe that smoking is a learned pattern of behavior valued out of proportion through the association of cigarettes with various important functions, such as pleasure and tension reduction. They further believe that these functions may or may not actually materialize (Schwartz, 1969).

Since smoking is learned, theoretically it ought to be amenable to "un-learning or deconditioning through the systematic removal of the stimulus-response bond associated with the act of smoking" (National Interagency Council on Smoking and Health, 1967, p. 192). Most behavioral attempts to control smoking involve one or a combination of the following techniques: (1) the association of cigarettes with unpleasant feelings; or (2) associating the lack of cigarettes with an external or internal increase in pleasurable feelings or reduction of negative feelings. Such treatment procedures have been beset with a number of methodological difficulties. These include inadequate controls, lack of appropriate stimulus generalization to extra-treatment situations, high subject loss, confounding of therapist effects by using multiple therapists, and inadequate follow-up procedures.

The treatment of smoking behavior is further complicated by the fact that habituation to smoking is the

result of a very complex system of physiological, social, and other environmental stimuli. For any one individual, some particular combination of these factors is most significant. Due to the complexity of the smoking habit Bernstein (1969) has stated that learning theory does not yet provide a practical, useful, and easily applicable set of behavior-modification procedures. It does, however, seem to represent the clearest, most systematic, and potentially fruitful approach to smoking reduction (Bernstein, 1969, p. 420).

The maintenance of a habituated response such as smoking appears to involve both positive and negative reinforcement at the same time. However, most studies directed toward smoking reduction deal with just one aspect of the behavior. Aversive techniques attempt to lessen the positive reinforcing aspects of smoking but ignore the factors associated with cigarette deprivation in particular situations.

Hunt and Matarazzo (1973) have suggested four methods for improving current smoking treatment programs: (1) more effective stimulus conditions within the treatment program; (2) more generalization potential outside the treatment room; (3) a combination of multiple techniques, as opposed to single treatment procedures, within the program continuing beyond the treatment phase; and (4) a broad comprehensive human engineering approach developed within

the program to encourage adaptation of treatment procedures to individual subject needs. No study has attempted to incorporate these suggestions into a coordinated research effort in smoking reduction. The present study attempts to evaluate the effectiveness of a behavioral approach which combines both positive and aversive techniques in a single program designed to reduce smoking.

Statement of the Problem

This study combines a variety of treatment procedures which have proven effective in individual use for temporary smoking reduction. The unique contribution from the study is the combination of specific treatment techniques and maintenance procedures designed to yield long-term smoking reduction results.

The study is designed to explore the following question: what particular treatment and maintenance procedure will prove most effective in reducing smoking among a group of college students who desire to reduce their smoking? In a broader context the study attempts to explore the value of combining various treatment techniques as well as the basic behavior modification paradigms of positive and aversive conditioning as applied to smoking behavior.

Sub-questions

The following specific questions are examined:

- A. Will positive treatment techniques paired with

positive maintenance procedures prove more effective in reducing cigarette smoking than positive treatment techniques paired with either aversive or no-maintenance procedures?

B. Will aversive treatment techniques paired with aversive maintenance procedures prove more effective in reducing cigarette smoking than aversive treatment techniques paired with either positive or no-maintenance procedures?

C. Will subjects receiving either positive or aversive treatment procedures show greater reductions in smoking behavior than subjects receiving no treatment regardless of the maintenance schedule employed?

D. Will subjects exposed to maintenance procedures demonstrate a more lasting reduction in cigarette smoking than those subjects not receiving maintenance procedures regardless of the treatment program employed?

E. Will the posttreatment smoking levels differ significantly from baseline for the positive and aversive treatment groups and the no-treatment control group?

Significance of the Problem

Bernstein (1969) states in his review of the smoking modification literature that "chaos prevails." He further states that most studies in smoking modification have lacked adequate controls to generate meaningful data and little attention has been directed toward the effect of long-term

maintenance procedures. This study examines the relationships of two maintenance procedures in conjunction with two treatment techniques. Hopefully, the results from this study will provide suggestions for maintenance programing in future studies. In addition, the study explored the relationship between various treatment and maintenance procedures. In the past little attention has been directed toward the interaction of different treatment procedures employed over a time interval with the same subject.

Additionally, the study yields information pertaining to the effectiveness of various treatment procedures which can be utilized by the subjects outside of the treatment setting. Since such a vast number of individuals who use cigarettes desire to stop or reduce their smoking behavior, any treatment technique which can be employed by the subject without the necessity of required training sessions is beneficial.

Rather than being a study of anti-smoking techniques directed at the subject, the current investigation employs techniques requiring active subject participation and the possibility of extending the treatment procedures to extra-treatment situations. The procedures utilized in the study can be incorporated into a personal "do-it-yourself" package.

The study also includes various treatment procedures within each package. Thus, for the first time information

is available concerning the effect of a combination of treatment procedures. Specific treatment techniques which have failed in the past may prove to be effective in combination with other techniques. Each specific treatment procedure employed in the present study has proven to be effective on post-treatment evaluations, but has lacked long-term smoking reduction significance.

Finally, the study adds general knowledge to the smoking modification literature regardless of the specific findings due to the unique combination of various treatment procedures. Careful analysis of the results will likely suggest areas of further study.

Assumptions and Limitations

This study is limited to the examination of techniques designed to affect smoking behavior changes and is not concerned with the nature of the smoking habit nor the history of smoking behavior of the subjects. The study is designed to examine the observable behavior of cigarette smoking and to compare techniques designed to reduce the level of consumption.

The subjects utilized in the study are college students, thus generalizations cannot be made beyond this population. Various factors involved in this subject population such as age, daily smoking level, length of smoking habit, and reasons for participating in the study may vary greatly from other subject populations.

The fact that the study utilizes volunteer subjects presents a further limitation on generalizations resulting from the study. The results must be applied and have significance only to similar populations volunteering for smoking modification treatment.

The subjects' self-report of cigarette consumption is used as the basic dependent measure. A significant assumption for the purpose of this study is that such a measure will be a reliable index of the subjects' smoking behavior (Bernstein, 1969, p. 43).

A major limitation of the study may be the attrition rate common to studies of this nature. However, it is assumed that the student-experimenter contract plus continual personal contact with each subject throughout the project diminishes this concern.

The fact that the experimenter is a male and a majority of the subjects female may have a reactive effect on the results. Any discussion or interpretation of the findings from this study must include this possibility. The male-female ratio is a direct result of the population from which the sample was drawn. However, several studies have shown no therapist effect in final analysis when this variable has been considered (Whitman, 1969; Marston & McFall, 1971).

One final limitation inherent in the study is the extra-treatment information regarding smoking and health

to which the subjects may have been exposed. Since the general public is widely concerned about the smoking issue various sources outside the treatment sessions, such as other courses, popular news media and television, could influence the subjects. However, the total randomization used in assigning subjects to treatment and maintenance groups, as well as the use of the control groups, should alleviate this problem. In addition, the study is not designed to explore the smoking and health issue but assumes the relationship between health and cigarette consumption has been adequately documented.

Definition of Terms

The following terms or concepts have particular importance within the framework of the present study.

Aversion Counterconditioning: the use of the counterconditioning procedure to condition an aversive response to a stimulus that previously elicited a positive, or approach, response.

Positive Reinforcement: a contingency between the onset of a pleasant event and a behavior that results in an increased frequency of the behavior.

Fear Communication: vivid emotional appeals that personalize the threat inherent or adverse consequences associated with smoking behavior.

Role Playing: standardized psychodramatic procedure designed to facilitate a scene or situation as though it

were really happening, using props and other staging devices to enhance the illusion of reality.

Peer Reinforcement: the pairing of individuals designed to offer emotional and social reinforcement during smoking reduction. A form of assistance whereby an individual is constantly aware of the availability of an interested party who will provide aid and support during the difficult period of smoking reduction.

Self-Control: the personal increase of control over one's behavior by using the principles of positive reinforcement utilizing self-reinforcing events to control other behaviors.

Positive Reinforcement Treatment Package: for the purpose of this study the positive reinforcement package will include those techniques and procedures designed to include positive motivational approaches toward smoking reduction. Emphasis is placed on positive self-control procedures and avoidance of negative factors associated with smoking. This package stresses the situational aspects of smoking behavior and encourages positive approaches toward modifying the situational variables.

Aversive Treatment Package: the aversive control package refers to those techniques and procedures designed to emphasize the negative consequences associated with smoking. The package includes approaches oriented toward aversive counterconditioning.

CHAPTER II

REVIEW OF LITERATURE

Introduction

A variety of experimental studies have been directed toward the reduction of smoking behavior. Techniques employed include drug therapy, supportive counseling, psychotherapy, systematic desensitization, and aversive conditioning. This review of literature is confined to those behavioral approaches which have shown promise for smoking reduction. The omission of other procedures employed in smoking reduction studies and clinics is not to be interpreted as an indictment of their efficacy. Rather, it is an attempt to delimit this review to the literature most relevant to this particular study. Specifically, this chapter examines three classifications of smoking reduction studies. They include: (1) studies which employed aversive treatment procedures; (2) studies which employed positive treatment technique; and (3) studies which have compared varied approaches to reduce smoking.

Aversive Treatment Procedures

Aversive treatment procedures have included punishment contingent on smoking behavior, emotional role playing emphasizing negative aspects of smoking responses and covert sensitization.

Wilde (1964) conducted a smoking modification study where the release of cigarette smoke mixed with hot air served as the aversive stimulus. The mixture was released when the subject smoked in the treatment situation. The use of hot air was an attempt to avoid anxiety often associated with electric shock. It also provided a more realistic aversive stimulus. A change to lightly mentholated room-temperature air along with the opportunity to eat a peppermint was contingent upon the subject putting out the cigarette and verbalizing the statement, "I want to give up smoking." After 6 to 20 trials, the subject was invited to smoke a cigarette which was put out after two or three inhalations even though no aversive stimulus was introduced. During the period between daily sessions subjects were instructed to try to recall the laboratory situation whenever they desired a cigarette and to eat a peppermint or peppermint substitute instead of smoking. Further, subjects were told to hold the cigarette between the lips as long as possible if smoking did occur. Treatment continued until subjects reported no further smoking. Wilde reports that three subjects out of seven stopped smoking after one or two sessions. However, all five subjects who remained in treatment eventually relapsed. The researcher suggested that "booster" treatments given periodically might help reduce the relapse.

Franks, Fried and Ashem (1966) utilized a variation of Wilde's technique in an attempt to control the latencies

and durations of the aversive and reinforcing stimuli. As soon as the subject extinguished the cigarette in the special ashtray designed by the researchers, the aversive stimulus was removed and replaced immediately by the lightly mentholated fresh air. This study suffered from a high attrition rate with only 9 subjects out of 23 completing the study. This was apparently due to the aversive nature of the design since most subjects rated the technique as highly aversive on a rating sheet.

Cautela (1966) modified the aversive approach to behavior therapy by utilizing a procedure he termed "covert sensitization." In this procedure the aversive stimulus is applied not externally but internally by the subject himself. For example, when the subject experiences the pleasurable but undesirable stimulus, he is to imagine an unpleasant sensation such as nausea. Thus, the control of the aversive stimulus is in the mind of the subject. Tooley and Pratt (1966) used this method in the extinction of smoking in a married couple. Although the treatment was successful, covert sensitization was used in combination with "coverant control" and "contractual management." Thus, the overall effectiveness of covert sensitization could not be determined. This technique has been used in comparative studies and will be discussed later.

The use of fear-arousing techniques to reduce smoking has been well documented (Leventhal, 1967; Freedman,

et al., 1970). In general, results have shown positive though limited success.

The psychological literature on the effects of fear arousal on attitude and behavior change is exceedingly complex and basic generalizations cannot be made. However, it appears that fear-arousal techniques should be employed only when the smoker is also given specific suggestions on how to control his habit. Freedman, Carlsmith, and Sears (1970) have indicated that fear techniques are most effective if presented from two sides of the issue. In other words, care should be taken to present the positive as well as the negative aspects of smoking. Leventhal (1967, 1965) has hypothesized that anti-smoking material accompanied by fear-arousing information would produce changes in both attitudes toward smoking as well as behavioral changes. In general, his studies have tended to support this conclusion.

Fear presentation can have a negative effect on behavior change. Watts (1966) found that a strong sense of vulnerability, stimulated by certain personality dispositions, prior smoking behavior, and extreme fear arousal can lead to a sense of inevitability and a failure to act. It is important, therefore, to bolster the individual's coping ability by giving individual alternative responses to deal with the fear source.

Leventhal (Borgatta & Evans, 1968) have summarized the findings from the majority of fear studies as follows:

- A. Stimulating motivations by means of threat information increases acceptance of recommendations, though the increase is greater for verbal than for overt behavioral compliance.
- B. While threat communications seem to increase motivation to avoid danger they do not appear to be sufficient to insure lasting changes in behavior.

An interesting approach to smoking modification has been explored by Janis and Mann (1965). They assigned 26 subjects to two experimental conditions: (1) "role-players" who acted in five scenes; and (2) passive observers. Each of the scenes was designed to emphasize negative or adverse effects of cigarette smoking. Neither group was given an indication that the project was an attempt to reduce their smoking behavior. Post-experimental measures yielded information which showed a marked increase in anti-smoking attitudes relative to the observers. However, two weeks later role-players reported an average decrease in smoking of 10.5 cigarettes per day, while the average decrease of the observers was only 4.8 per day.

Mann (1966) modified the previous procedures by employing three types of role-playing and two verbalization conditions. He found that "emotional" role-playing was more effective in changing both smoking attitudes and smoking behavior than was "cognitive" role-playing (acting as a debater).

There is evidence to show that the effect of role-playing is related to the individual's ability to generate his own information on smoking and cancer. Janis and Mann (1965) demonstrated a statistically significant reduction in smoking behavior between a group who engaged in role-playing and a non-role-playing control. They concluded that role-playing helps subjects break through such defenses as denial of vulnerability and resistance to persuasion. As a result, the subject often experiences a sense of personal vulnerability. Mausner, Krassen, and Platt (Borgatta & Evans, 1968) have found similar results and believe role-playing is most effective with people who believe they control their own future. At this point it is not clear how the information provided in the role-playing situation procedures changes either attitudes or behavior. It is not known if the critical factor is actually playing an active role versus confronting an authority, or being exposed to information and props on danger.

One of the major motivating factors influencing a person to stop smoking is a direct awareness of the recognized risks of smoking. Role-playing is an attempt to simulate this awareness. Ideally, the more realistic the role-playing situation, the more effective the behavioral change.

Studies designed to show success of smoking reduction techniques show that aversive procedures rarely produce

better than a 60% reduction in smoking behavior by the end of treatment (Steffy, Meichenbaum, & Best, 1970) and usually demonstrate deterioration to about 75% of the original baseline on follow-up (Keutzer, 1968; Ober, 1967). Further, those aversive procedures that utilize punishment in the form of physical shock or warm, smoky air usually experience high attrition rates.

Positive Treatment Procedures

Many early attempts to modify smoking behavior through positive treatment procedure shared two common characteristics. First, they provided alternative responses to take the place of the smoking response. Such suggestions as chewing gum, sucking on candy or handling a pencil were often indicated. The second characteristic of early smoking modification procedures was the encouragement of subjects to substantially change their environment by altering their total living situation. In 1938 Furnas offered such recommendations as chewing food a specific number of times before swallowing, keeping especially clean, and taking hot baths as ways to make changes in the smoker's daily life style. Many of these early techniques or recommendations are still evident in some more recent publications (Shryock, 1965; Cain, 1964).

Attempts to modify smoking behavior by instituting new behaviors as a substitute for smoking often fail because long-term success is based upon continued occurrence

of the new behavior. Usually the new behavior is inconvenient, fatiguing or inappropriate over long-term periods. As a result their effect as a substitute gradually diminishes.

The application of "coverants" (or thoughts) to one's private behavioral events has been described by Homme (1965). This is a procedure which allows the individual to manage his own reinforcement contingencies. Here the problem is to find effectively reinforcing events which can be made contingent upon specified behaviors. For smoking behavior the procedure involves listing all possible coverants which are incompatible with smoking behavior. These constitute low probability behaviors to be reinforced by an agreed-upon pleasant and frequent behavior--the high probability behavior. The subject systematically reinforces the anti-smoking coverants by not engaging in the high probability behavior until he has thought of one item on the anti-smoking inventory. No specific research endeavor has attempted to test this theory, although Homme (1965) has reported success with students and colleagues as subjects.

The Tooley and Pratt (1966) study mentioned earlier did employ some aspects of this procedure as one of their treatment methods. One implication from the Tooley and Pratt report is the possibility of success from a combination of treatment modalities as opposed to single treatment procedures.

Some researchers have suggested that smokers can be assisted in reducing or controlling their habit if they are aware of those patterns of their daily lives associated with smoking (Frederickson, 1969; Horn, 1967). It has been postulated that such awareness can lead to a rearrangement of their environment which would aid in the avoidance of stimuli associated with smoking. An elaborate procedure to break the association between specific stimuli and the response of smoking has been described by Pumroy and March (1966). The smoker lists activities during which he smokes and rates these activities in terms of enjoyment of smoking. By starting with the least attractive smoking period and gradually expanding to include more reinforcing smoking situations the subject diminishes his smoking behavior. Supposedly the subject becomes deconditioned to specific sets of cues and is rewarded for not smoking when smoking is least strongly reinforced.

Pumroy and March tested their theory by conducting an experiment lasting five weeks with weekly group sessions. Ten of the thirty original volunteer subjects completed the treatment program. All ten subjects who completed the treatment reportedly reduced their cigarette consumption although the authors provided no data to support that conclusion. A six-month follow-up yielded the following information: of eighteen subjects responding, two had completely stopped smoking and fifteen had reduced their

pre-experimental smoking level. Again, the lack of appropriate statistical analysis prevents the emergence of any clear conclusions.

Mausner (1971, p. 169) commenting on the failure of hierarchial approaches to reduce smoking has stated that such failure may be due to a "fundamental inadequacy in the procedure of gradual reduction by eliminating cigarettes wanted least."

It is well known that many people who smoke heavily find that only a minority of the cigarettes they smoke actually "taste good" (Mausner, 1971, p. 169). Cutting down on the unattractive cigarettes may be counterproductive because the smoker continues to be heavily reinforced when he does indulge, while the anti-smoking contingencies internal and external lose their novelty and their effects gradually wear off (Mausner, 1971). It is conceivable that the continued smoking of only those cigarettes which fulfill meaningful needs may actually increase the attractiveness of the habit.

Researchers have attempted to find ways to provide immediate reinforcing contingencies during smoking reduction programs. Since the adverse consequences of cigarette smoking are usually future concerns, the immediate reinforcing factors associated with smoking maintain the behavior. Logan (1973) has stated that control can be exercised equally by internal response-produced stimuli according to

substantially the same principles as apply to external control (i.e., individual self-control).

One of the major advantages of self-control procedures is the fact that they may be practiced outside the treatment setting. Thus, they alleviate the problem of generalization decrement from the experimental setting to extra-session situations. Feldman (1966) contends that this generalization decrement accounts for the major source of rapid extinction of therapy gains.

Logan has proposed that self-control habits be considered as learned behaviors. In this way the individual can engage in activities that will improve his capacity for self-control. Acceptance of this concept enables consideration of the self-control for non-smoking behavior. According to Logan the major objective is to find a method where a person can learn an effective habit to insure dominance of the non-smoking response when the self-control of smoking drive is aroused. For example, a student who customarily smokes a cigarette while studying might be encouraged to select another place to study or to sit down to study without the materials needed for smoking.

Another positive reinforcement technique is peer reinforcement. Here subjects are paired and encouraged to assist each other in smoking reduction. Studies using this approach (McFarland, Gimbel, Donald, & Folkenberg, 1964; Campbell & Spalding, 1967; Thompson & Wilson, 1966)

often utilize a variety of supplemental treatment approaches. This procedure is often used in five-day clinic plans and has proven most successful in smoking reduction with success rates ranging from end-of-treatment percentage reductions of 72% to 42%.

Comparative Studies

During the last ten years a number of studies have been conducted which have attempted to compare the relative effectiveness of various approaches to smoking reduction.

A well-controlled study conducted by Koenig and Masters (1965) compared the effectiveness of aversion therapy, systematic desensitization and supportive counseling therapy. Forty-two subjects smoking one or more packs of cigarettes a day comprised the experimental groups. The aversive stimulus, which was an electric shock, was randomly paired with nine of the eighteen consecutive and specific responses found to be involved in smoking a cigarette. The study attempted to break the smoking chain by attaching aversive shock consequences to various acts involved in the chain. Nine treatment sessions were spread over a six-week period. During each session the subject smoked two cigarettes and the aversive shock was administered at various times during the act of smoking.

Subjects were trained for one session in the Wolpe-Lazarus method of relaxation. During the remaining

sessions subjects were exposed to a hierarchical ranking of smoking situations while in the relaxed condition. Theoretically, the subject was to experience "high occurrence" smoking situations while in a relaxed state, thus inhibiting the desire to smoke.

Supportive-counseling therapy was designed to test the relative effect of a purely verbal interchange related to non-directive psychotherapy.

Although there was no significant effect for treatment, there was a significant main effect for therapists. Thus, it was concluded that some unspecified qualities of the respective therapists were more intimately related to change in smoking behavior than the treatments the therapists administered.

In this study the dependent measure consisted of weekly percentages based on initial baseline prior to treatment. The baseline was taken to be 100% and improvement consisted of some percentage less than 100%, with zero percent representing complete abstinence. End of treatment means were 50.6%. However, after six months the smoking means had increased to 74.6%. The authors did not compile individual smoking rates for each subject. Thus it is open to conjecture as to whether or not rates dropped dramatically for a few subjects or whether there was a uniform drop for all subjects. Attrition rates, so common in aversive smoking studies, were not specified.

Therefore it is not known how many subjects completed the nine treatment sessions. The study did confirm the almost traditional initial smoking reduction followed by a gradual relapse to prior smoking levels.

One problem in assessing the study results is that no control groups were used. Koenig and Masters justified this omission by indicating that the supportive counseling group constituted a control. Since this group did have a therapist conduct the sessions and since the study found a significant therapist effect, it would have provided strength to have a no-treatment control group.

Ober (1966) compared a self-control program, aversive therapy and transactional analysis therapy. Sixty volunteer subjects were placed in one of the three treatment groups or a no-treatment control group. Two therapists treated six to nine subjects under each treatment condition. One unique feature of Ober's design was the fact that he checked the accuracy of subject self-reporting by comparing corroborative reports of the subject with an acquaintance ($r = .94$ correlation).

Subjects in the treatment groups were seen for ten fifty-minute sessions over a period of four weeks. At each session subjects were instructed to turn in a daily record of smoking behavior. Each treatment group reduced its smoking rates significantly more than did the control group. However, there were no significant treatment or

therapist main effects. Ober stated that following treatment 25 subjects had stopped smoking and none of these had relapsed by the follow-up four weeks later.

A comparative study involving a composite treatment of systematic desensitization, group discussion, anti-smoking literature and subject self-monitoring was conducted by Pyke, Agnew and Kopperud (1966). Analysis of variance, using number of cigarettes smoked as the dependent measure, demonstrated a significant Groups x Time interaction. The experimental group was more successful in reducing smoking than either of two control groups. However, at the four-month follow-up interval there were no longer any significant differences of pre- and post-experimental levels of smoking for any of the three groups.

Wagner and Bragg (1970) compared five methods for the control of habitual smoking in a study which utilized systematic desensitization, covert sensitization, a combination of these two approaches, relaxation, and counseling. Fifty-four subjects were seen twice weekly for eight twenty-minute individual treatments. The first three sessions were devoted to relaxation training and the last five to different experimental treatments. A control group consisting of subjects who dropped out during the relaxation phase of the study was also employed. However, the value of this group as a control is questionable since they received partial experimental treatment.

An overall analysis of variance failed to detect a significant difference between treatments. However, the total number of cigarettes smoked decreased significantly for all treatment groups and remained so through a 90-day follow-up period. The results of this study demonstrated a more lasting reduction in smoking behavior than produced by the Koenig and Masters study (1965). Two unique features emerged from this study. First, there was a reduction in smoking behavior following the relaxation sessions and pre-experimental record keeping and second, the combined systematic desensitization and covert sensitization group had the lowest mean smoking rate at the 90-day follow-up. This was one of the first studies to combine treatment procedures. The lower mean rate for the combined treatments was encouraging though significance was not demonstrated.

A recent study by Marston and McFall (1971) compared four approaches toward smoking reduction. A technique of stimulus satiation was utilized with one group. Subjects were advised to chain-smoke three cigarettes each time they smoked, obtain cigarettes only from the clinic, hold the cigarette continental style (between thumb and forefinger), develop awareness of the smoking situation and to keep a continuous record of every cigarette smoked.

A second group used a hierarchial method of smoking reduction. Subjects were given instructions to eliminate smoking entirely during the least "tempting" time of the day

for smoking. During the remainder of the treatment phase they were advised to gradually reduce smoking during other periods of the day. In addition, counterconditioning techniques were employed. These included muscle relaxation, social commitment, coverants and behavioral rehearsal.

A third group utilized a pill control condition as part of the experimental design. A nondrug aversive spice tablet was administered whenever the subject had an urge to smoke. The combination of the pill and cigarette smoke introduced into the room when the subject smoked produced an aversive taste for the subject. This group also kept a continuous record of smoking behavior.

A final group simply attempted to quit smoking via the "cold turkey" method. A list of arguments and counter-arguments against smoking was handed out along with various suggestions on how to stop smoking.

All four groups met for 45-minute sessions twice a week for three weeks. Each treatment group was handled by one of two therapists. A total of eight groups participated in the study. Sixty-five subjects originally were part of the study but due to insufficient data nine were dropped from the final analysis.

From an analysis of the smoking records of the subjects the following conclusions were drawn:

- A. The overall smoking rate at the end of treatment was down from 26.4 to 4.9 per day.

- B. Using a criterion measure of 85% smoking reduction as the measure of success, 52.3% of the subjects succeeded in reducing smoking at the termination of treatment.
- C. At a follow-up period of 12 months 13.8% of the subjects met the success criteria and the mean smoking rate was 18.3 per day. Actually, the subject rate of smoking, while declining during the treatment phase, gradually approached pre-experimental rates following treatment. Also, no therapist effects were evident from the overall analysis of variance. The study reaches the same basic conclusions as other studies: (1) gradual decline during treatment; (2) relapse following treatment; and (3) no significant difference between treatment procedures.

One of the unique features of this study was the recording of cigarettes smoked each day during the treatment phase of the study. This technique provided one interesting finding. Members of the stimulus satiation group who "failed" to reduce smoking rates during treatment demonstrated the greatest increase in smoking behavior during the initial phase of treatment. Since the technique is based on aversive conditioning it would be expected that the group that followed the satiation procedures diligently would yield the greatest reduction in smoking, yet the opposite emerged. One explanation for this finding

might be that the treatment did not continue long enough since all of the members of the satiation group listed as failures did show a reduction in smoking rates during the last two sessions of treatment.

A study designed to compare information dissemination, aversion conditioning, and incompatible behavior development was conducted by Whitman (1969). The information dissemination group was given information detailing the undesirable aspects of smoking in pamphlet and film form. The aversive group was characterized by two aversive stimuli: quinine and electric shock. With each third cigarette smoked subjects shocked themselves. This shock was administered following the decision to smoke but prior to actual smoking. If they elected to smoke they placed the quinine on their tongues. The incompatible behavior development group was given an elaboration of basic concepts and related techniques for unlearning smoking behavior. Such concepts and techniques included shaping, chaining, environmental restraints and the use of incompatible behaviors.

All subjects were required to attend five weekly one-hour treatment sessions conducted over a five-week span. Four data points were considered. These included smoking behavior at: (1) pretreatment; (2) termination of treatment; (3) one week after treatment; and (4) three months after treatment.

Although there was a significant reduction in smoking for all treatment groups, there were no significant differences between the three therapies in the amount of reduction.

One factor influencing the final results of this study is that Whitman excluded 37 subjects from the final analysis because they failed to attend three of the five sessions. Generally, dropouts from therapy are considered as therapeutic failures. Since 37 were excluded in the final analysis of data, Whitman's conclusions would seem to be invalid.

Lawton (1967) combined an educative program of health information regarding smoking with group therapy and compared this technique to three other group approaches which included group therapy, intensified group therapy, and educational information. Lawton found no difference among any experimental treatment groups, although all treatments resulted in significantly greater reduction than that which occurred during control periods. A major problem with interpretation of this study was the extensive attrition rate in every group. Some groups lost as many as 16 subjects during treatment.

A study which utilized both aversive and cognitive factors was conducted by Steffy, Meichenbaum and Best (1970). Three treatment groups were compared with an insight control group. Electric shock was used as the common

aversive stimuli in each of the three treatment groups. Shock was administered at various times during the smoking chain and the subject could terminate the shock by extinguishing the cigarette or disavowing the habit. The three treatment procedures varied in their use of covert and overt verbalization plus actual behavioral rehearsal as opposed to non-action. In the overt verbalization-action group (OVA) the subject was asked to describe a high probability smoking situation and then describe the details of his smoking behavior in that situation. To escape shock the subject was required to behaviorally discard the cigarette.

The overt verbalization-non-action group (OVNA) required the same verbalizations as above, but did not include behavior rehearsal. The final treatment group, covert-verbalization-action (CVA) required the subject to imagine himself in the situations he earlier had indicated as being conducive to smoking and to quietly smoke the cigarette. The avoidance or escape from shock was achieved by either the refusal to smoke or the vigorous extinguishing of the cigarette.

Steffy, et al., used subject self-report, peer validation, and daily recordings of smoking behavior as dependent measures. Ober (1967) had used a similar validation technique and found self-reports to be an accurate method for assessing smoking behavior. In final analysis the CVA (covert-verbalization-action) group demonstrated

the most effective modification of smoking behavior at two-month and six-month follow-ups. Whereas all other experimental groups had returned to fairly high proportions of their original smoking rate, the CVA condition maintained a level of 38% at the six-month follow-up. These results permit speculation that manipulation of covert events and behavioral rehearsal of the deviant act (smoking in this case) may be important adjuncts to the aversive paradigm by virtue of the greater generalizability of these self-generated cues to extra-therapy situations. In addition to the positive significance of the results, this study represents one of the more successful attempts to combine various treatment techniques with specific experimental groups.

After a review of smoking literature McFall and Hamman (1971) contended that the post-treatment smoking reduction so common in most smoking modification studies is due to nonspecific elements of the experimental designs. They hypothesized that such elements as motivated volunteers, structure, and self-monitoring contribute to this reduction in smoking behavior.

To test this hypothesis, 38 volunteers were assigned to one of four treatment procedures. These four experimental conditions received identical treatment except for instructions on self-monitoring. "Treatment" consisted only of suggesting the subject stop smoking and saying that since smoking control is a matter of positive self-control no gimmicks would be used.

The major independent variable in the study was the self-monitoring factor. Monitoring techniques included daily recording of cigarettes consumed, recording each time they were unable to resist the urge to smoke, recording each time they resisted temptation to smoke, and a fixed-positive self-monitoring technique whereby the subject was to earn 20 points a day, receiving a point each time he resisted a cigarette craving.

The study yielded no significant differences in success rates for the four different groups. However, there was a tendency for the more structured negative and fixed positive groups to perform better. Findings from this study suggest the importance of minimal self-monitoring procedures and the importance of some degree of structuring in control group procedures when comparing various smoking reduction techniques.

A comparative study which utilized a large sample was undertaken by Keutzer (1967). Four treatment techniques were compared. These included: (1) coverant control therapy; (2) breath-holding technique; (3) negative practice; and (4) placebo drug therapy.

Two of the approaches were basically aversive measures (breath-holding technique and negative practice). The other two were based primarily on positive reinforcement paradigms. Subjects were seen in groups once a week for four weeks in sessions lasting one hour.

The primary dependent variable was the degree of success in cigarette reduction. This variable was calculated as a percentage by dividing the average daily smoking rates during the last week of treatment by the average daily smoking rates during the baseline week and multiplying this quotient by 100. A 50% smoking reduction was considered treatment success. The total subject pool included 213 subjects. One hundred and forty-nine received treatment and 64 comprised the control groups.

Findings revealed that subjects who participated in the treatment program were significantly more successful in reducing smoking rates than were subjects in the control group. There were, however, no significant differences between various methods of treatment. One possible explanation for this lack of significance between treatments might be due to the fact that actual treatment was confined to three treatment sessions. Thus, treatment effects might not have had sufficient time to alter smoking behavior.

Studies Combining Treatment Approaches

Two recent studies have incorporated a number of treatment procedures in a single program. Schmahl, Lichtenstein and Harris (1972) treated 28 habituated smokers with either warm, smoky air or warm, mentholated air. Additional aversive consequences were included since subjects were instructed to smoke at a rapid rate. However, all subjects were exposed to components other than the aversive

stimuli. Emphasis was placed on positive expectations and provisions were made for social reinforcement of smoking reduction. In addition, effort was made to maximize experimenter and subject contact.

The results of this study are superior to studies using similar aversive procedures (Grimaldi & Lichtenstein, 1969; Lichtenstein & Keutzer, 1969). The investigators reported a 100% cessation rate at termination and one of 64% at the six-month follow-up. In a discussion of the results Schmahl, et al, mentioned the fact that the inclusion of the positive treatment procedures was a differentiating element in their study as compared to other aversive studies.

Chapman, Smith, and Layden (1971) used strong punishment plus a nonpunished alternative with training in self-management skills. An interviewing procedure was used to reinforce appropriate behavior between sessions. This is the only study reviewed which was specifically designed with the treatment program to include both positive and aversive treatment procedures with the same subjects.

The study divided 23 subjects into two groups. Although the treatment techniques for the two groups were standardized one group received post-treatment therapist monitoring for two weeks and the second group for 11 weeks. At a 12-month follow-up nine subjects had stopped smoking completely. Six of the nine abstainers were in the second group. The authors drew two conclusions: (1) faradic shock

punishment combined with self-management training is an efficient method to eliminate cigarette smoking, and (2) post-treatment therapist monitoring seems to be an important variable affecting long-term cessation of smoking.

It is interesting to note that the two studies combining treatment procedures reported results superior to those studies using single treatment procedures. Although both studies had relatively small samples the results indicate a need for further study with combined treatment approaches.

Summary

From the review of literature on smoking modification it is evident that attempts to combine various treatment procedures have been limited. Those studies which have combined treatment techniques have reported success with the approach (Tooley & Pratt, 1966; Chapman, Smith, & Layden, 1971; Schmahl, Lichtenstein, & Harris, 1972).

Regardless of the techniques or procedures utilized in the studies discussed in this review there emerges a similar pattern. Immediate post-experimental smoking reduction is followed by a gradual diminishing effect until only a small core of nonsmokers remain who have relinquished the habit. Hunt and Matarazzo (1973, pp. 108-109) identified four possible remedial characteristics which, if employed in future smoking studies, may improve the long-term results. They suggested:

1. That we try for more effective stimulus conditions, ones with more generalization potential outside the laboratory treatment room. An example would be the substitution as an aversive stimulus of hot, dry air for the prevalent electric shock.
2. That we combine multiple treatment techniques on our procedures instead of relying on aversive conditioning sessions alone. For instance, we might combine aversive conditioning with instruction in self-control methods.
3. That we pay more attention to the maintenance of behavior rather than concentrating all our efforts on its acquisition. Instead of assuming that once a person stops smoking there is no further need for treatment, we might recall him periodically for booster sessions, possibly incorporating these with improved follow-up procedures to the mutual benefit of both.
4. That we take a more comprehensive human engineering approach to our subjects, making more use of ancillary supportive measures such as regulated exercise, self-applied treatment approaches such as Jacobson's relaxation techniques, and relevant recreational and social activity. In this engineering, the individual would be the focus of planning rather than the treatment program.

The design of the present study provides for the incorporation of these suggestions. Those techniques reviewed which demonstrated the greatest treatment success have been included in this study. Also attempts have been made to eliminate some of the major methodological problems common to the smoking reduction programs reviewed.

CHAPTER III

PROCEDURES

This study was designed to examine the effectiveness of two functional classifications of behavioral approaches to smoking reduction. The study was conducted during the fall semester of 1973 at the University of North Carolina at Greensboro.

Subject Selection

A brief questionnaire (see Appendix E) was distributed to students enrolled in nine sections of an introductory course in psychology, one section of an abnormal course, one section of a personality course, and two sections of a human development course. Students enrolled in these courses ranged from freshmen to seniors, with a predominant number being sophomores. In addition, sex ratio was overwhelmingly in favor of females.

Eight hundred and eighty students returned the questionnaire. Two hundred and sixty-three indicated they were smokers. Of this number 156 expressed interest in participating in a study designed to modify their smoking behavior. Twelve of the 156 students who desired to participate in the study had smoking rates too low to be included (less than ten a day). The remaining 144 subjects

were contacted and invited to attend a brief orientation meeting designed to provide information related to the requirements of the study.

Seventy-six subjects attended one of five fifteen-minute orientation sessions. At the completion of each orientation session a form was provided for the subjects to sign if they wished to participate in the study. After hearing the requirements 47 subjects agreed to participate. Main reasons for the failure of other subjects to participate included inconvenient time for meetings and the concern that six sessions would be too time-consuming.

Orientation Meeting

Orientation meetings lasted approximately 15 minutes each and covered essentially the same information. Subjects were informed that certain methods and techniques designed to reduce smoking behavior were going to be compared. It was emphasized that the study would examine group data and that individual comparisons would not be made. This emphasis was made to help insure accurate recording of smoking behavior.

In addition, subjects were told that only a specific number of subjects could be accommodated and that those not assigned to a treatment group would be contacted later. This group of 15 comprised the no-treatment control group.

All subjects participating in the study were instructed to complete a baseline recording to be turned in at the end of one week (see Appendix G). A brief discussion of

adequate baseline assessment was provided. Subjects were encouraged to provide an accurate recording and not to attempt to modify their smoking behavior prior to the beginning of the study. Forms were provided for recording smoking behavior. The format included estimating the number of cigarettes smoked three days prior to the meeting and tabulating the actual number smoked for four days.

Times for the first group sessions were provided and subjects were informed that those selected for treatment programs would be given the room number for their session prior to the first meeting.

All subjects participating in the study were given a contract to sign. This contract acknowledged each subject's awareness of the project's purpose and constituted his agreement to complete the requirements of the study (see Appendix F). Lichtenstein and Keutzer (1973) have suggested that this procedure can be an effective way to reduce attrition rates.

Finally, subjects were thanked for their participation and reminded that the baseline report could be returned at the first meeting or mailed to the experimenter.

Discussion initiated by the subjects varied from one orientation meeting to another. However, such discussion essentially dealt with the amount of time involved in the study, the nature of the treatment and the mechanics involved in providing the data. The question concerning the

type of treatment was asked most frequently. The main point clarified was that no physical or painful techniques would be employed.

Experimental Design

Subjects were randomly assigned to one of three groups: positive treatment, aversive treatment, and no treatment control. The positive and aversive treatment groups were given four 50-minute treatment sessions which were conducted bi-weekly for two weeks. The no-treatment control group did not receive any treatment during the two-week period.

The basic design for this study parallels the pretest-posttest control group design as discussed by Campbell and Stanley (1963). It has the added feature of repeated measures within groups.

Assignment to Treatment Groups

The 47 subjects who participated in the study were assigned on a random basis to one of three groups: (1) 16 to a positive reinforcement treatment group; (2) 16 to an aversive treatment group; and (3) 15 to a no-treatment control group. Sixteen subjects were included in the two treatment groups in the preliminary assignment to allow for possible attrition.

Treatment Procedures

Positive Reinforcement Treatment

The positive control treatment procedures emphasized a variety of techniques designed to influence and reinforce non-smoking behavior in a positive manner. Each session lasted approximately 50 minutes and was scheduled twice a week for two weeks.

The positive reinforcement group was exposed to the following program. Information relative to factors that maintain smoking behavior was covered. Such ideas as peer influence, modeling, and smoking as a response to tension were explored. Subjects were instructed in methods designed to identify the antecedent factors conducive to smoking. Subjects kept daily diaries (Mausner & Platt, 1971) listing those situations present when smoking was initiated. Suggestions on techniques of positive self-control were presented following the application of self-control suggested by Logan (1973)

The purpose of the diary was to make the smoker aware of situational cues evident in smoking behavior. As the situational cues became more obvious to the smoker he could utilize self-control procedures to rearrange the circumstances of daily living in order to decrease the "need" for a cigarette. In addition, once the smoker had clearly identified the situational antecedents of smoking, he could

systematically reduce the range of stimuli for which his smoking was respondent.

Positive consequences of not smoking were introduced. Subjects were given lists of positive outcomes associated with not smoking. At specific times during the day each subject was instructed to read the list. The positive statements were designed to reinforce the cessation of smoking. The list was continually expanded throughout the sessions.

Subjects in the positive reinforcement group were paired with one another. The members of each pair in the group were encouraged to assist each other in smoking reduction. They were to talk to each other daily to discuss any problems in stopping smoking. Additionally, each was encouraged to offer support to the other member of the pair any time one or the other felt the need to resume smoking. This procedure was based on the concept utilized by The Five Day Plan of Smoking Reduction (McFarland, 1970). It was an attempt to control smoking behavior by social reinforcement.

Each of the positive reinforcement group sessions is detailed in the following description:

First session - During the initial treatment session subjects were exposed to a discussion of situational factors associated with smoking. Subjects were encouraged to keep a diary of their smoking behavior and to become

aware of those situations and conditions associated with the initiation of smoking behavior. This "awareness" helped sensitize the subjects to the dynamics of the smoking habit and assisted in placing their smoking behavior in proper perspective.

Subjects were encouraged to divide their waking hours into four equal parts and rank in order those times during the day when smoking was most pleasurable. They were then instructed to select that quarter of the day which proved to be most satisfying for smoking behavior and to stop smoking during that quarter by the second session. A previous study conducted by Marston and McFall (1971) used a similar approach. However, they had their subjects stop smoking during the quarter of the day which proved least satisfying for smoking behavior. Mausner (1971) has suggested that the low, long-term success rate of the Marston and McFall study may have reflected a fundamental inadequacy in the gradual reduction procedure. He indicated that subjects who postponed reducing their consumption of cigarettes during the most satisfying time may actually have increased the attractiveness of the habit. Cutting down on the unattractive cigarettes may be counterproductive since the smoker continues to be heavily reinforced when he does smoke.

The concept of peer reinforcement was also introduced during the first session. Subjects were divided into pairs

and each member of the pair was instructed to give the other member his phone number and those times during the day when he could be reached. The members of each pair were instructed to call each other at least twice a day to provide support and reinforcement during the initial reduction phase. It was indicated that the effectiveness of this approach would be evaluated in subsequent sessions.

The last portion of the first session was devoted to discussion of a handout consisting of three positive reasons for not smoking and clarification of positive outcomes associated with non-smoking behavior (see Appendix I). Subjects were told to read each of the three statements at specific times during the day. Reading of the statements was not to be while smoking or when the "urge" to smoke was present. The statements were designed to be incompatible with smoking in order to reinforce non-smoking behavior

Second session - The second session began with a general discussion of the subjects' success during the period between the first and second sessions. This was a general group discussion. Emphasis was placed on reinforcing non-smoking behavior and suggesting ways to reduce smoking in subjects having difficulty during the first phase of treatment.

The concept of self-control was developed and positive self-control procedures such as the following were introduced:

- A. If smoking occurred most during times of study, then subjects should study in no-smoking areas such as the library, etc.

- B. If smoking was frequent after meals, subjects were encouraged not to delay after eating, but to engage in some other activity not associated with smoking.
- C. Subjects were instructed to avoid situations conducive to smoking or to leave their cigarettes behind if they had to encounter high smoking situations.
- D. Subjects were told to place cellophane tape around the filter end of their cigarettes in order to alter the normal chain of events associated with smoking.

Subjects were encouraged to discuss the antecedent situations associated with smoking. Individual self-control procedures designed to deal with specific environmental events were identified.

Problems associated with the peer reinforcement technique were discussed and the next three positive statements were handed out. Finally, subjects were instructed to stop smoking during the second most pleasurable quarter of the day between the second and third sessions.

Third session - The beginning of the third session was devoted to a discussion of individual subject success in non-smoking behavior. Subjects were encouraged to discuss the positive results of non-smoking behavior. Such comments as improved self-respect, favorable response from non-smoking friends, more freedom, and general improvement in physical functioning were most common. Subjects were instructed to place greater emphasis on the positive changes associated with non-smoking behavior.

Those subjects experiencing difficulty in reducing their smoking behavior were encouraged to keep detailed

accounts of those specific situations associated with their smoking behavior and to develop a list of self-control procedures to use during their high probability smoking situations.

The third list of positive statements was handed out and subjects were instructed to read all nine statements at various times throughout the day. Subjects were encouraged to memorize the list so that they could repeat the statements as often as possible.

The peer reinforcement technique was discussed again and each pair was asked to contact one another at least two times a day between sessions three and four.

Finally, each subject was instructed to extend his non-smoking behavior into the third quarter of the day and to continue with his reduced smoking during the previously mentioned first and second quarters.

Fourth session - Each subject was requested to identify the major benefits he had derived from the level of smoking reduction obtained. Emphasis was placed on a detailed interpretation of the positive outcomes of smoking reduction.

In addition, each subject discussed those self-control procedures that had proved to be most beneficial in reducing his smoking behavior.

A discussion of the smoking chain was developed and subjects were informed of the importance of being aware of those stimuli which elicit smoking behavior. Particular

emphasis was placed on the significance of breaking the chain in order to reduce smoking behavior. Self-control procedures mentioned earlier were restated as suggestions for altering the chain of events which lead to smoking.

The final list of three statements was presented, bringing the total to twelve. Subjects were encouraged to continue repeating the list daily.

Also, subjects were encouraged to reduce their smoking during the final quarter of the day. Finally, each subject was asked to solicit the assistance of a friend outside of the treatment group to assist him in continuing his smoking reduction.

Aversive Treatment Group

The aversive group experienced a variety of negative reinforcing techniques designed to emphasize the adverse effects associated with cigarette smoking. The sessions lasted approximately 50 minutes and were conducted twice a week for two weeks.

The aversive control group was exposed to sessions wherein the negative consequences of smoking were emphasized. Negative health consequences associated with smoking were discussed. Emphasis was placed on the relationship of smoking to cancer and heart disease plus some immediate negative effects such as bad breath and stains on the fingers. Fear instruction was supplemented by a movie and a film strip.

The movie, Smoking: A New Focus, stressed the adverse consequences of smoking from a broad perspective. The film strip, The High Cost of Smoking, was designed to portray in graphic form the risk inherent in cigarette smoking. Following the movie and film strip, subjects were encouraged to discuss the most impressive and aversive factors presented in the media.

Also, fear situation role playing was a basic aspect of the aversive control group. Role playing has been used successfully in behavioral research to effect attitude and behavioral change. Excellent results of role playing in smoking reduction studies have been reported by Janis and Mann (1965) and Lichtenstein et al. (1969) which demonstrate the overall effectiveness of this technique. In this study, each of the subjects in the aversive control group portrayed a patient consulting a physician for a nagging cough. As part of the enactment, the smokers learned that they had a malignant tumor. The patient and physician then discussed the prognosis and possible treatment. Subjects were encouraged to utilize information provided in the film and filmstrips in order to provide realism to the role playing situation. In addition to the fear arousal resulting from the role playing situation it was believed that this technique may also promote involvement and participation. This has been shown to facilitate learning and behavior change (Lichtenstein & Keutzer, 1973).

Each member of the aversive group wrote a list of adverse effects resulting from smoking on an index card. They were asked to refer to this card prior to engaging in some activity which would result in a high probability of smoking.

Finally, each member of this group was encouraged to identify some adverse effects which occurred in the daily life of a smoker. These effects were to be a direct result of the smoker's smoking behavior. For example, they might include other people coughing or having their eyes water from being in a smoke-filled room. This was an attempt to extend the experimental situation to the real world.

A description of each of the aversive control group sessions follows.

First session - A film strip, The High Cost of Smoking, was shown during the first meeting. This film strip emphasized the negative health consequences of smoking and depicted the adverse effects of smoking graphically via visual scenes. Detailed scenes of cancer, emphysema and other adverse consequences of smoking were shown. In addition, the statistical risk of premature death associated with smoking was presented.

Following the film strip subjects were asked to identify at least three scenes illustrated in the film strip and to "visualize" them prior to engaging in some high probability of smoking behavior. This procedure is based

on the technique developed by Homme (1965) and employed by Keutzer in her smoking reduction study (1967).

Second session - The film, Smoking: A New Focus, was shown at the start of the second session. This film again stressed the adverse effects associated with smoking and discussed some of the factors leading to the onset of smoking behavior. Following the film, each subject was asked to list three major points stressed which emphasized to them the adverse effects of smoking. Once again subjects were encouraged to "visualize" or think about those points prior to engaging in some high probability behavior. Subjects were requested to continue using the original list developed in the first session in addition to the new list.

Further, subjects were instructed to think about their physical condition while they were smoking. In their way, subjects concentrated on their own adverse physical effects from smoking. For example, almost all smokers complain of some irritation of the throat after smoking a number of cigarettes, and one cigarette noticeably speeds up the heart rate for most smokers. The second session attempted to "personalize" some of these adverse effects.

Finally, each subject was instructed to observe smoking behavior in others and to identify those factors which could be considered adverse conditions associated with the behavior. Examples such as reactions of non-smokers, burning sensations of the eyes from smoke, and the smokers' cough were offered as guides.

Third session - The major thrust of the third session was devoted to fear role playing. The situation was structured similar to the technique utilized by Janis and Mann (1965) and Mausner and Platt (1971). Subjects were paired--one portrayed a doctor and the other the patient. The doctor explained to the patient results of laboratory tests which confirmed that the patient had terminal lung cancer. Subjects were encouraged to use information provided in the film and film strip viewed during sessions one and two. Each pair was instructed to improvise as much as possible and to make the situation realistic. A variety of props were used to encourage realism and each pair had actual chest X-rays to study. The pairs met by themselves in separate rooms and the experimenter observed the role playing through closed curtains and a room divider.

Following this session each subject was instructed to reflect back on the feelings he experienced during the role playing session.

Fourth session - The fourth session began with a discussion of the role playing situation. Most groups indicated a general "uneasy" feeling associated with the role playing and verbalized that it made them stop and think about smoking.

Next, each individual member was asked to write on an index card those conditions associated with smoking which he considered most offensive. Emphasis at this time was placed more on the socially related adverse effects than

on physically related adverse effects. This was done to make the smoker realize how a non-smoker might view him. Subjects were asked to start thinking as a non-smoker.

The subjects were requested to continue verbalizing the negative factors associated with smoking prior to engaging in a high probability behavior. Also, they were told to continue adding new statements to their list in an effort to keep the negative factors at a high reinforcing level.

No Treatment Control Group

This group did not meet formally but filed their baseline report and provided a post-treatment report of cigarette consumption. At the time they filed their baseline data they were encouraged to reduce their smoking behavior and were informed they would be called for treatment at a later date.

Maintenance Procedures

Following the end of the treatment phase of the study, subjects were assigned to one of two maintenance groups: positive procedures or aversive procedures. Fifteen subjects were randomly placed in each of the two above-mentioned groups and 17 were assigned to a no-maintenance control group. Subjects in the positive and aversive treatment groups were assigned on a random basis to either positive, aversive, or no-maintenance conditions. At

this point in the study there were nine different treatment-maintenance combinations.

Positive Maintenance Procedures

The positive maintenance group met for two sessions. These sessions met one week and three weeks following the end of the treatment phase. Each session lasted approximately 50 minutes and stressed positive self-control procedures designed to assist in smoking reduction.

A detailed account of each positive maintenance session follows:

First session - Modification of a technique employed by Tooley and Pratt (1967) was introduced during this session. Tooley and Pratt devised a method of "contractual management" whereby two partners agreed to a non-smoking contract. Acceptance of various rights and rewards was held contingent upon each member of the pair abstaining from smoking for a specified amount of time. Keutzer (1967, p. 9) commenting on this technique stated that an advantage of this method over other behavior modification methods is that it can be utilized explicitly to prevent relapse after extinction has been accomplished. Subjects in the positive maintenance groups were asked to make a contract with themselves. They were requested to place a specified amount of money in a jar and to indicate a period of time (preferably double the length of time which they can now go without a cigarette) during which they would

refrain from smoking. The only way they could receive the money would be to exhibit non-smoking behavior during that time period. If they failed to complete the designated time period they were to give the money to a roommate or friend. Two suggestions were offered to help make the "contract" more binding. One was to have the friend or roommate actually keep the money and return it only after the subject completed the non-smoking period. The second was to keep the money in an envelope addressed to the financial committee of the political party opposite of the subject's preference. The envelope would be mailed if the subject did not complete his non-smoking period.

In addition, the concept of peer-reinforcement was discussed. Subjects were requested to identify two non-smoking friends who would be willing to assist them in modifying their smoking behavior. The subjects were encouraged to seek assistance from these friends during the period from the first to second maintenance sessions.

Second session - This session began with a discussion of the success of the contractual management approach developed during the first session. Most subjects indicated some degree of success. The major problem associated with the technique appeared to be a lack of authenticity with regard to the money. Subjects indicated it was their money and they could get it whether they smoked or not. As a result, subjects were encouraged to identify that group or organization which they disliked most and to write a check

for a specific amount of money to that group. This check was to be held by a friend or roommate who was instructed to mail it if the subject failed to live up to the nature of his contract. Most subjects verbally agreed to try this technique.

The remainder of the session was devoted to a discussion of the self-control procedures covered during the treatment phase of the positive control group. However, emphasis was placed more on an awareness of how it felt to be a non-smoker and the positive feelings generated toward oneself as a result of demonstrating self-control over a previously well engrained habit.

Aversive Maintenance Procedures

The fifteen subjects assigned to the aversive maintenance group met for two sessions, one week and three weeks following the treatment phase of the study. Each session lasted about 50 minutes and emphasized the negative or aversive features associated with cigarette smoking.

These sessions were detailed as follows:

First session - At the beginning of the first session three pamphlets were handed out (see Appendix J). Subjects were instructed to read through each pamphlet and identify a total of five adverse health consequences associated with cigarette smoking. These five factors were to be listed on an index card and read whenever the subject was about to engage in some high probability behavior exclusive of

smoking. Examples such as studying, eating, or brushing teeth were identified as high probability behaviors.

Subjects were instructed to look for evidence of negative factors demonstrated by others who engaged in smoking. Each member was to identify those factors which they believed to be most offensive to non-smokers and to think about these prior to entering a situation conducive to smoking.

Second session - The film strip, The High Cost of Smoking, was shown and subjects were instructed to "visualize" those scenes which appeared most vivid prior to engaging in a high probability behavior. Also, subjects were requested to concentrate on some of the physical factors associated with smoking whenever they participated in smoking behavior. They were given examples such as throat irritation, cough, heart rate increase, and burning sensation around the tongue as guides to direct their thinking.

Finally subjects who indicated difficulty in reducing their smoking were instructed in the satiation technique employed by Marston and McFall (1971). They were instructed to smoke no fewer than three cigarettes each time they felt the need to smoke. Additionally, while they were smoking the cigarettes they were asked to concentrate on the adverse physical effects.

No Maintenance Control

The seventeen subjects assigned to this group did not meet and were involved in no maintenance procedures. They

were, however, contacted and requested to report their smoking behavior following the maintenance phase of the study.

Data Collection

The data used in the statistical analysis for the study was obtained at four points. Each subject recorded a baseline tally of the number of cigarettes smoked for one week. This recording was made the week preceding the start of the study. The subjects estimated their smoking behavior for the three days prior to the actual recording and then tallied the exact number of cigarettes smoked for four days. The baseline was obtained in this manner so as to reduce the effects of the reactive nature of the recording process. In other words, the three-day estimate would prevent any gross understatement of smoking behavior caused by the actual recording.

Additional data were collected at three points. The subjects were requested to record their smoking behavior the Friday following the last treatment session, the Friday following the last maintenance session, and the Friday three months after the beginning of the treatment phase.

Reliability of the self-reports were checked by having the subject list the name, phone number, and number of cigarettes smoked in front of a person whom they had had considerable contact with on that Friday. The named individuals were then contacted on a purely random basis and

asked to indicate how many cigarettes the subject had smoked in their presence. A correlation coefficient was computed between the two reports using the Pearson Product-Moment Correlation Technique.

Control of Variables

Complete random assignment of each subject to the treatment groups provided control for motivational differences through the principle of randomization (Kerlinger, 1965).

Attempts to control subject loss were made through the use of a contract which each subject signed stating his intention to complete the study. Also personal contacts with the subjects pertaining to group meetings and data gathering assisted in preventing subject attrition.

Finally, the random assignment of subjects to the various treatment and maintenance groups negated any major differences in pre-experimental information regarding smoking and health.

Analysis of Data

Data for the analysis were obtained from subject self-reports of smoking behavior at four points during the study: (1) mean daily smoking level seven days prior to the start of the study; (2) the first Friday following treatment; (3) the first Friday following the completion of maintenance; and (4) the first Friday following the end of the three-month study. The dependent measures consisted of daily smoking reports on the specified days and a

percentage of smoking reduction based on baseline smoking levels. The baseline was taken to be 100% and reduction in smoking behavior consisted of some percentage less than 100%, with zero representing complete abstinence. The various data point figures were divided by the mean baseline smoking rate and the product multiplied by 100 to yield the percentage of reduction.

A one-way analysis of variance was used to test for significant differences among the positive and aversive treatment groups and the control group on baseline data. The critical level of significance for this difference was established at the .05 level. The mean daily number of cigarettes smoked for seven days prior to the start of the study served as the dependent variable.

A one-way analysis of variance on posttreatment smoking levels was computed. A percentage of reduction from baseline smoking level was used as the dependent measure. The critical level of significance was established at the .05 level.

A 3 x 3 x 4 analysis of variance (using Treatment x Maintenance x Time of measurement) was computed to answer the questions under investigation. This was a repeated measures design with subjects nested under the treatment and maintenance factors (Winer, 1971, p. 560). Mean daily smoking rates were used as dependent measures for this analysis. Differences exceeding the critical level of .05

were considered significant. In addition, significant differences revealed by the analysis of variance were further analyzed by the Newman-Keuls procedure for post-hoc interpretation of significant results.

The Pearson Product Moment Correlation technique was utilized to establish the relationship between subject self-report of smoking behavior and that reported by a designated acquaintance.

CHAPTER IV

PRESENTATION AND INTERPRETATION OF DATA

This study was undertaken to determine the effects of a combined treatment approach on smoking behavior. Forty-seven subjects were randomly assigned to one of three treatment groups: positive, aversive, or no-treatment control. Following four treatment sessions conducted over a two-week period the subjects were randomly assigned to one of three maintenance groups: positive, aversive, or no-maintenance control. Each subject assigned to either the positive or aversive maintenance group received two additional treatment sessions. Those subjects assigned to the no-maintenance control did not meet as a group.

All subjects participating in the study smoked at least ten cigarettes a day and demonstrated an interest in reducing the number of cigarettes they smoked. Each subject recorded the number of cigarettes he smoked each day for seven days prior to the start of the study. Also, the subjects were required to sign a contract stating their willingness to participate in the study and to supply the data needed for the final analysis. Data were provided at four points during the course of the study. Smoking level was assessed at the beginning of the study, following treatment, after maintenance and at the three-month follow-up.

Distribution of Subjects

A total of 45 subjects were included in the final analysis. Two subjects from the initial group of 47 were dropped from the final analysis due to incomplete data reporting.* Table 1 gives a numerical breakdown of subject assignment to the various treatment and maintenance groups.

Baseline Records

Each subject was required to record a baseline level of smoking behavior for one week prior to the start of the study. The baseline levels ranged from a low of 8 to a high of 45 cigarettes per day. The mean daily level of smoking behavior for the two treatment groups was 22.13 for the positive group and 20.26 for the aversive group. The no-treatment control group yielded a mean daily smoking rate of 20.73. Table 2 contains the means and standard deviations for each group.

A one-way analysis of variance was computed to determine whether a significant difference existed among the three groups on the baseline means. Table 3 summarizes the results of this analysis.

The resulting F from this analysis was far below that required for significance. It was concluded that no

*One of the subjects dropped from the analysis was in the positive treatment-no-maintenance group and the other had been assigned to the aversive treatment-no-maintenance group.

TABLE 1
Subject Assignment

	Maintenance Group		No	
	Positive	Aversive	Maintenance	Total
Positive Treatment	5	5	5	15
Aversive Treatment	5	5	5	15
No Treatment	5	5	5	15
	<hr/>	<hr/>	<hr/>	<hr/>
Total	15	15	15	45

TABLE 2
Baseline Smoking Means and Standard
Deviations by Treatment Groups
(Cigarettes per Day)

Treatment Group	N	\bar{X}	s
Positive	15	22.13	7.58
Aversive	15	20.26	6.12
No Maintenance	<u>15</u>	<u>20.73</u>	<u>7.48</u>
Total	45	21.04	7.14

TABLE 3
Analysis of Variance on Baseline Means for the
Positive and Aversive Treatment Groups and
the No Treatment Control Group

Source	df	MS	F
Treatment Groups	2	14.02	.25
Within	<u>42</u>	56	
Total	44		

difference existed among the means of the three groups prior to the start of treatment.

Table 4 provides further information on baseline smoking levels. This table reveals the distribution of subjects over the positive and aversive treatment groups and the no-treatment control group on the basis of smoking frequency. Two subjects recorded baseline means of less than ten cigarettes per day. It is possible that the act of recording the number of cigarettes smoked each day caused those subjects to alter their smoking level.

This frequency distribution of smoking levels is comparable to that found by Keutzer (1967). She stated: "Though classification schemes vary from study to study, this group of smokers is what is generally termed the moderate smoker" (Keutzer, 1967, p. 118).

Reliability of Subject Reporting

In order to evaluate the reliability of subject self-report four checks on accuracy of reporting were conducted during the duration of the study. The first check compared a random sampling of 15 subjects on their initial response to a questionnaire designed to determine their willingness to participate in the study. Part of this questionnaire requested an estimate of the subject's smoking behavior. This estimate was compared to the actual baseline report established prior to the start of the study.

TABLE 4
Distribution of Subjects over Control and Treatment
Groups on Baseline Smoking Rates

Baseline Smoking (Number of Cigarettes Smoked Daily)	All Subjects	Aversive	Positive	Control
1-5	0	0	0	0
6-10	2	1	0	1
11-15	6	2	1	3
16-20	19	5	8	6
21-25	8	4	1	3
26-30	6	2	4	0
31-	4	1	1	2

A Pearson product moment correlation resulted in an r of .72 for the 15 subjects. This r was significant at the .05 level.

The second check compared the subject's estimate of the number of cigarettes smoked in front of an informant with that informant's estimate of the subject's smoking level. This comparison yielded a highly significant r of .92 for 8 subjects.

The check which followed maintenance included 10 subjects and the reported r of .99 was significant at the .05 level.

The final check computed on data obtained at the three-month follow-up on 10 subjects produced an r of .96. This was significant at the .05 level. Actual data from subjects and informants are listed in Appendix D.

Treatment Results

A one-way analysis of variance using percentage of smoking reduction from baseline to the posttreatment data point was computed. This analysis was designed to evaluate specifically the success of the two treatment groups as compared to the no-treatment control group. Percentage of smoking reduction from baseline served as the dependent measure so that comparisons could be made with studies utilizing similar measures (Keutzer, 1967; Schmahl, Lichtenstein, & Harris, 1973; Chapman, Smith, & Layden, 1971). This variable was calculated as a percentage by dividing the average daily smoking rates obtained at posttreatment by the average daily rates reported during the baseline and

multiplying this quotient by 100. Table 5 summarizes the results of this analysis.

The obtained F was significant at the .05 level indicating a significant difference between the three groups in terms of percentage reduction from baseline smoking levels. The positive treatment group had a posttreatment mean percentage reduction of 54.6 as compared to 58.8 for the aversive group and 91 for the control (see Table 6). Thus, in terms of the percent of reduction, both the positive and aversive treatment groups reduced their smoking nearly in half, while the no treatment control group reduced smoking by less than 10 percent. A post hoc analysis comparing the differences among the three means was computed using the Newman-Keuls test. The only difference reaching significance was that between the positive treatment group and the control group which proved significant at the .05 level. There was no significant difference between the aversive treatment group and the no treatment control group. In addition, the positive and aversive treatment groups did not differ significantly.

Combined Treatment-Maintenance Results

Table 7 lists the mean smoking reduction percentage for the various combinations of treatment and maintenance groups at the end of the maintenance phase of the study. This table depicts the differential effects of the

TABLE 5
Analysis of Variance: Posttreatment

Source	df	Ms	F
Treatment	2	5985.01	4.41*
Within	<u>42</u>	1356.06	
Total	44		

*Significant at the .05 level.

TABLE 6
 Posttreatment Means and Standard Deviations by
 Treatment Groups (Percentage of Baseline
 Smoking Reduction)*

Treatment Group	N	\bar{X}	s
Positive	15	54.6	25.19
Aversive	15	58.8	19.65
Control	<u>15</u>	<u>91</u>	<u>29.01</u>
Total	45	68.13	39.9

*0 indicates total abstinence

100 indicates same smoking level as baseline

TABLE 7
Mean Percent of Smoking Reduction
at the End of Maintenance*

	Maintenance Groups			
	Positive	Aversive	Control	Average
Positive Treatment	51	56	50	52.33
Aversive Treatment	38	45	71	51.33
Control	65	70	76	70.33
Average	51.33	57	65.66	57.99

*0 indicates total abstinence.

100 indicates same smoking level as baseline.

maintenance groups on the two treatment groups and the no treatment control group. As seen from this table the positive maintenance procedures produced the greatest reduction in smoking levels.

Table 8 reveals the percentage reduction in smoking level at the three-month follow-up. Again, the positive maintenance procedures resulted in the greatest reduction.

Few studies have established a criterion for success in smoking reduction studies. Schwartz (1969, p. 484) indicates that this is one of the problems in evaluating research in the area. Keutzer (1967) interpreted a 50% reduction in smoking level as evidence of success in her study. Table 9 shows a numerical breakdown of the subjects in each treatment-maintenance combination in terms of the 50% reduction criterion.

Table 9 shows the number of subjects who maintained a 50% reduction in smoking level at the three-month follow-up. The positive treatment-positive maintenance group demonstrated the greatest degree of success. Four out of the five subjects in the group had maintained at least a 50% reduction level three months following treatment. Inspection of this table reveals the poor results obtained by subjects who received no maintenance procedures. Fifteen subjects received no maintenance procedures and only three of the fifteen demonstrated a reduction in smoking level of 50% or less.

A 3 x 3 x 4 analysis of variance (using Treatment groups, Maintenance groups, and Time of measurement) was

TABLE 8
Mean Percent of Smoking Reduction
at the Three-Month Follow-Up*

	Maintenance Groups			
	Positive	Aversive	Control	Average
Positive Treatment	43	64	46	51
Aversive Treatment	41	56	81	59.33
Control	73	52	78	67.66
Average	52.33	57.33	68.33	59.33

*0 indicates total abstinence.

100 indicates same smoking level as baseline.

TABLE 9

Number of Subjects Maintaining a 50% Reduction
in Baseline Smoking Level at the
Three-Month Follow-Up

Maintenance Groups				
	Positive	Aversive	Control	Total
Positive treatment	4 out of 5	1 out of 5	2 out of 5	7 out of 15
Aversive treatment	3 out of 5	2 out of 5	0 out of 5	5 out of 15
Control	1 out of 5	3 out of 5	1 out of 5	5 out of 15
Total	8 out of 15	6 out of 15	3 out of 15	17 out of 45

computed. The dependent measure used in this analysis was the mean number of cigarettes smoked by each subject at the time of measurement. The actual number of cigarettes smoked was used as the dependent measure for this analysis because the baseline recording was included. Using the percentage reduction score for each subject would have resulted in omitting the baseline figure since that figure would have been 100% for each subject.

Table 10 summarizes the results of the three-way analysis of variance. The model of this analysis was a three-factor design with repeated measures on one factor. Each of the groups was observed under all levels of factor C, but each subject was assigned to only one combination of factors A and B.

Two significant main effects emerge from this analysis: a main effect of maintenance procedures and a time of measurement main effect. The data reveal that the maintenance group to which a subject was assigned had a significant influence on the modification of his smoking level when averaged over the four data points. In addition, there were significant differences in smoking behavior for the subjects depending on the time at which the smoking level was obtained irrespective of treatment-maintenance groupings. Post hoc analyses on these two significant F ratios were computed.

Although the F ratio for the maintenance groups (4.42) was significant, a Newman-Keuls test among the three

TABLE 10
 Analysis of Variance Using Treatment
 Groups, Maintenance Groups and
 Time of Measurement

Source	df	ms	F
Treatment (A)	2	328.90	1.96
Maintenance (B)	2	740.62	4.42*
Time (C)	3	783.84	25.34*
AB	4	31.88	< 1.00
AC	6	60.96	1.97
BC	6	29.23	< 1.00
Subjects (S) AB	36	167.45	
ABC	12	38.89	1.25
SC (AB)	108	30.92	

*Significant at the .05 level.

means did not discern a statistically significant difference. Clarke and Clarke (1971, p. 11) suggest that if the F ratio was significant it can be assumed that the statistical significance was attributed to the pair of means with the greatest difference regardless of the results of post hoc tests. In this study that greatest difference occurred between the positive maintenance group (12.88) and the no maintenance control group (18.88).

The significant F ratio attributed to time of measurement (25.34) was also tested by the Newman-Keuls procedure (see Table 10). The latter three measurement points--posttreatment, following maintenance, and follow-up at three months--differed significantly from the baseline mean. However, there was no difference among the latter three measurement points. This finding suggests that there was a significant drop in smoking level across all groups following treatment. In addition, there appeared to be no significant relapse in smoking level during the course of the study.

Maintenance Effects

Figures 1 and 2 show the effects of the maintenance groups on the two treatment groups and the control group. Figure 1 illustrates the maintenance effect on the mean number of cigarettes smoked for each treatment group and the control group following the maintenance phase of the

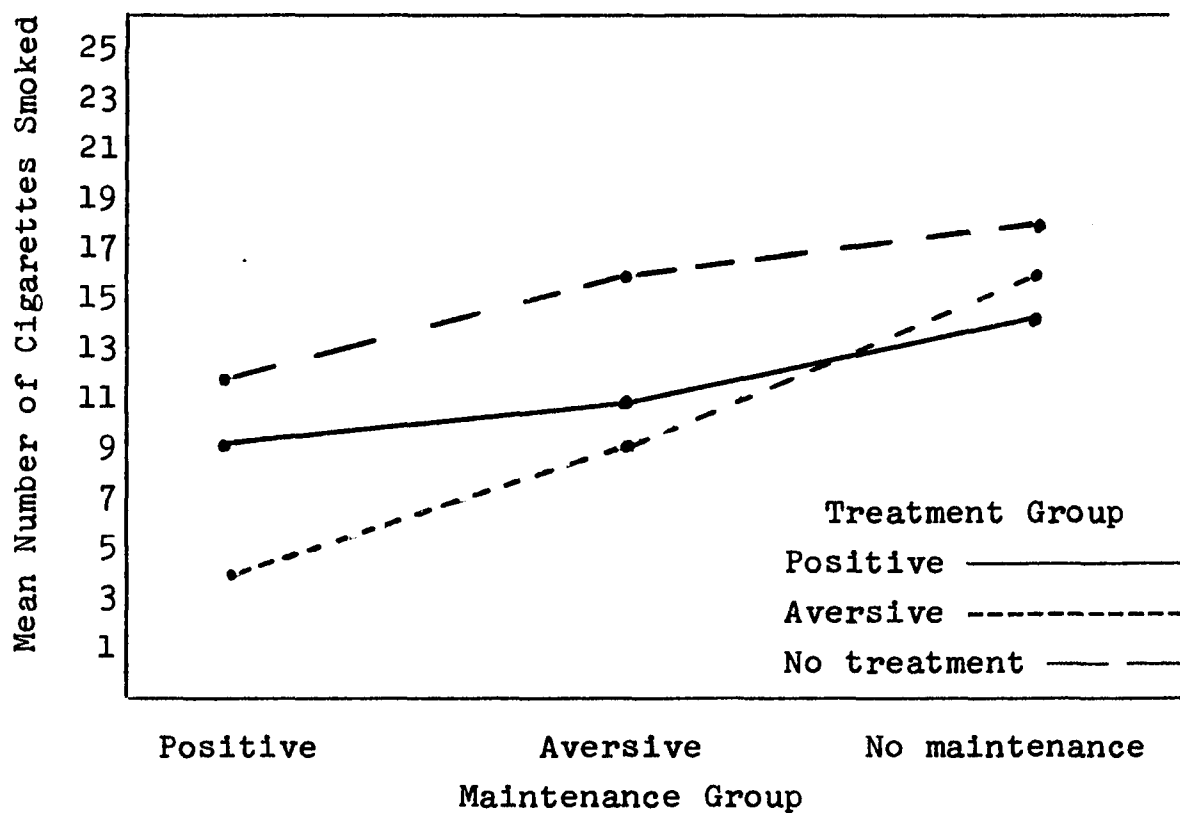


Fig. 1. The effects of maintenance procedures on the control and positive and aversive treatment groups following the maintenance phase of the study.

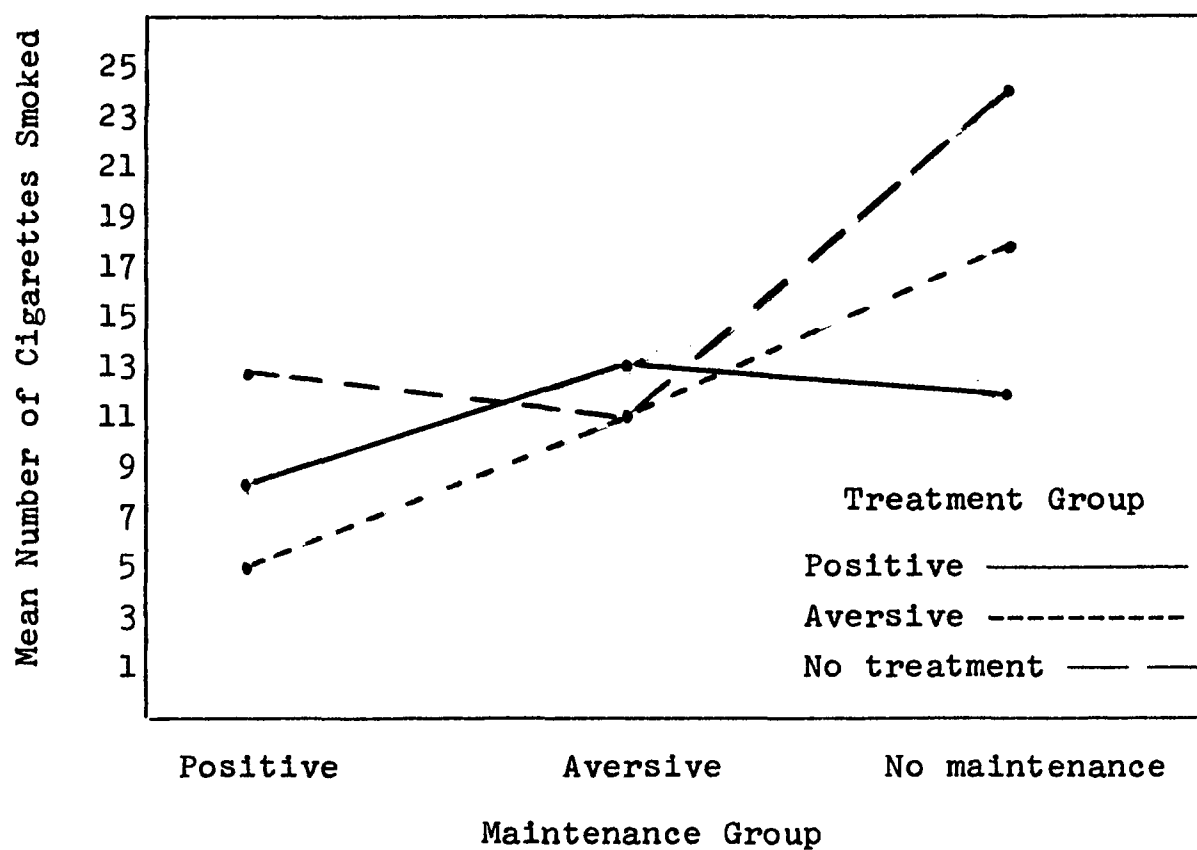


Fig. 2. The effects of maintenance procedures on the control and positive and aversive treatment groups at the three-month follow-up.

study. Figure 2 demonstrates this effect at the three-month follow-up. The positive maintenance procedures resulted in lower smoking levels in every treatment-maintenance combination except for the no treatment control group which received aversive maintenance (see Figure 2).

Figures 3, 4, and 5 depict in graphic form the mean number of cigarettes reported at the four measurement points for the positive and aversive treatment groups and the control group respectively. Also included in the figures are the various maintenance groups.

Figure 3 illustrates the effects of positive maintenance procedures on the positive treatment group. Subjects who received positive maintenance procedures recorded the lowest level of smoking at the post-maintenance and follow-up data points. Subjects in the aversive maintenance group actually smoked more cigarettes than reported by subjects receiving no maintenance at the three-month follow-up.

Figure 4 further illustrates the effect of positive maintenance procedures. Subjects in the positive maintenance group reported the lowest level of cigarette smoking at the post-maintenance and follow-up data points.

A comparison of Figure 5 with Figures 3 and 4 shows one major disparity. The aversive maintenance group had the lowest smoking rate at the three-month follow-up. This is the only point at which the aversive maintenance

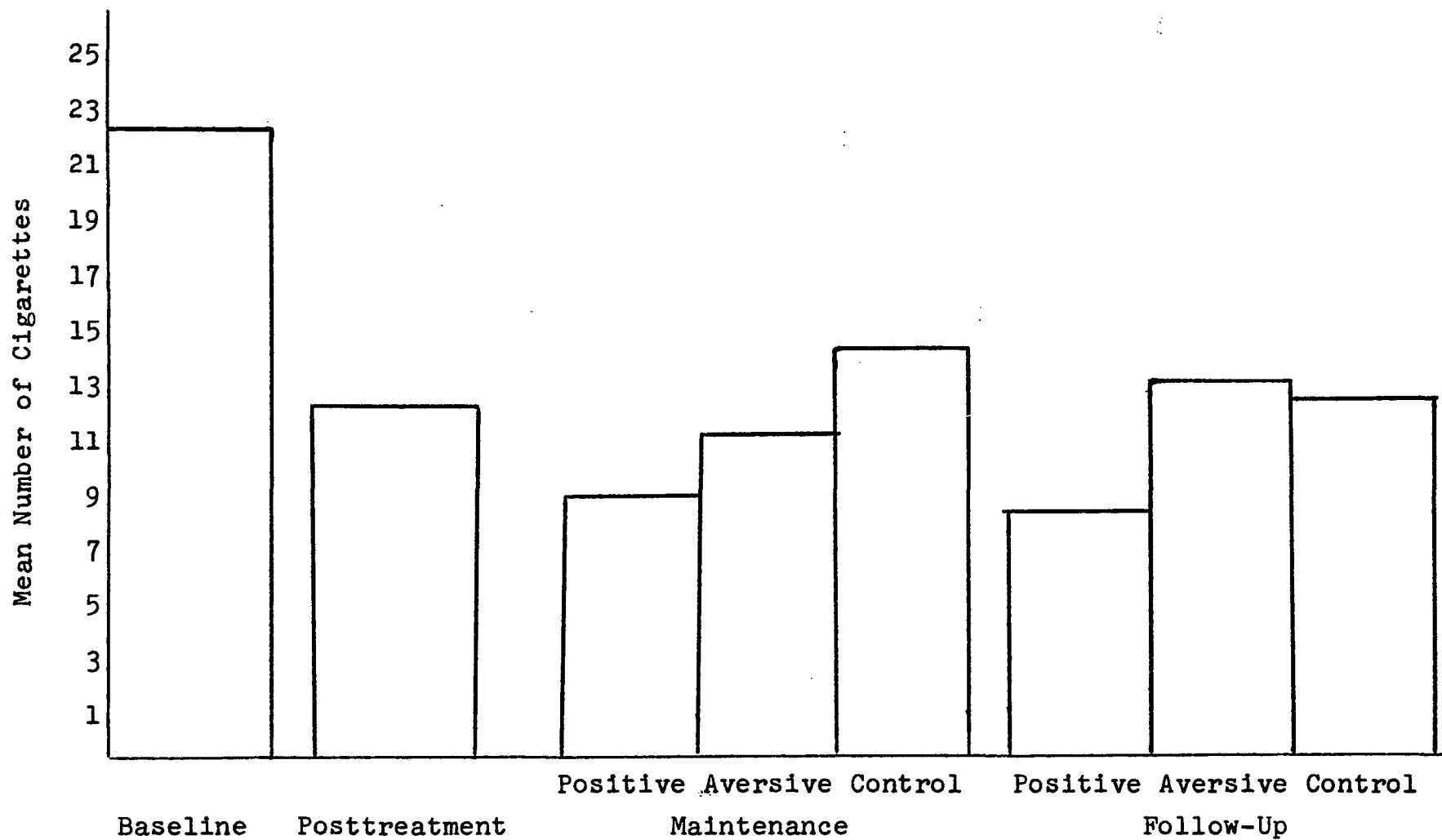


Fig. 3. Mean smoking behavior of positive treatment group over four data points

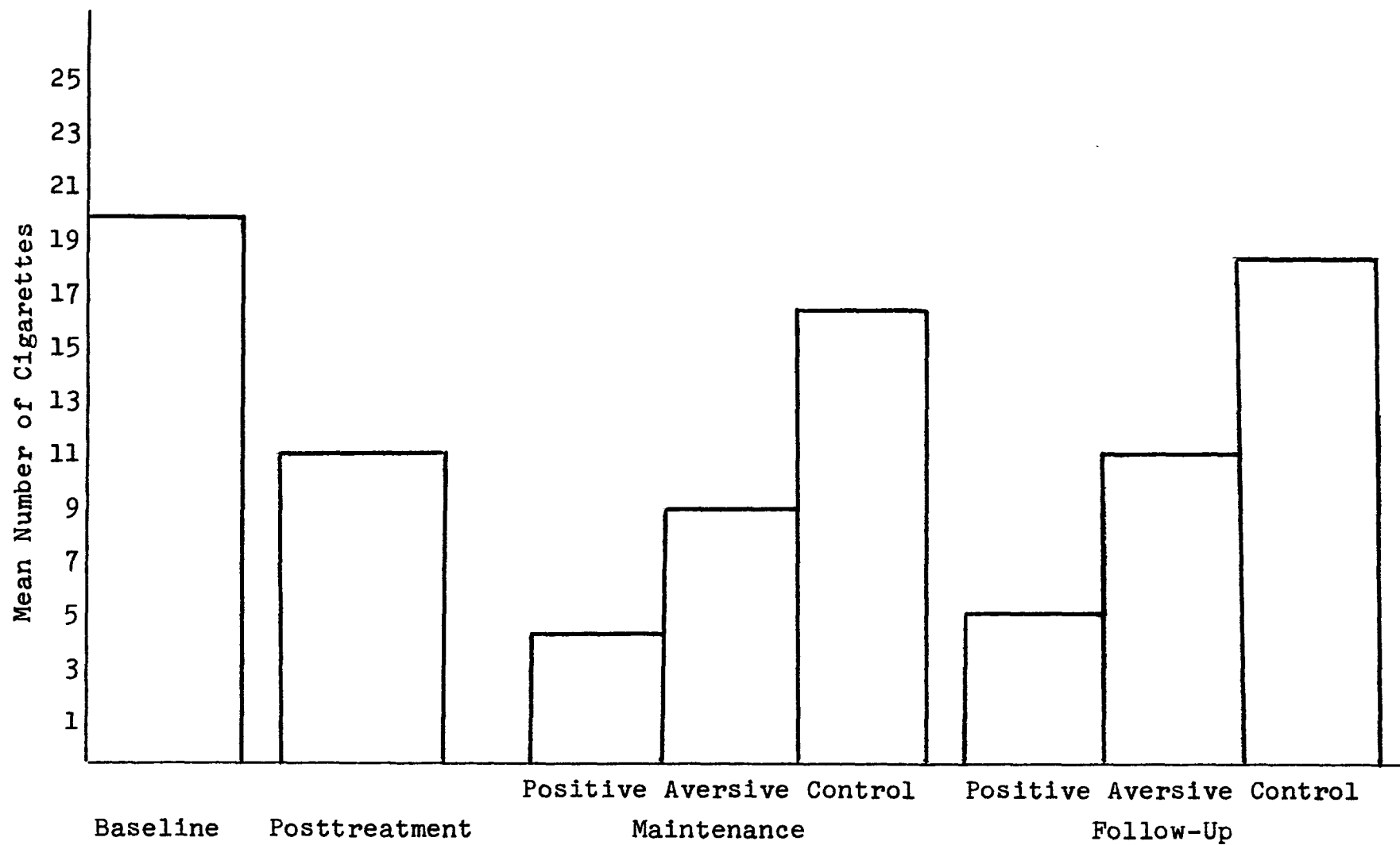


Fig. 4. Mean smoking behavior of aversive treatment group over four data points.

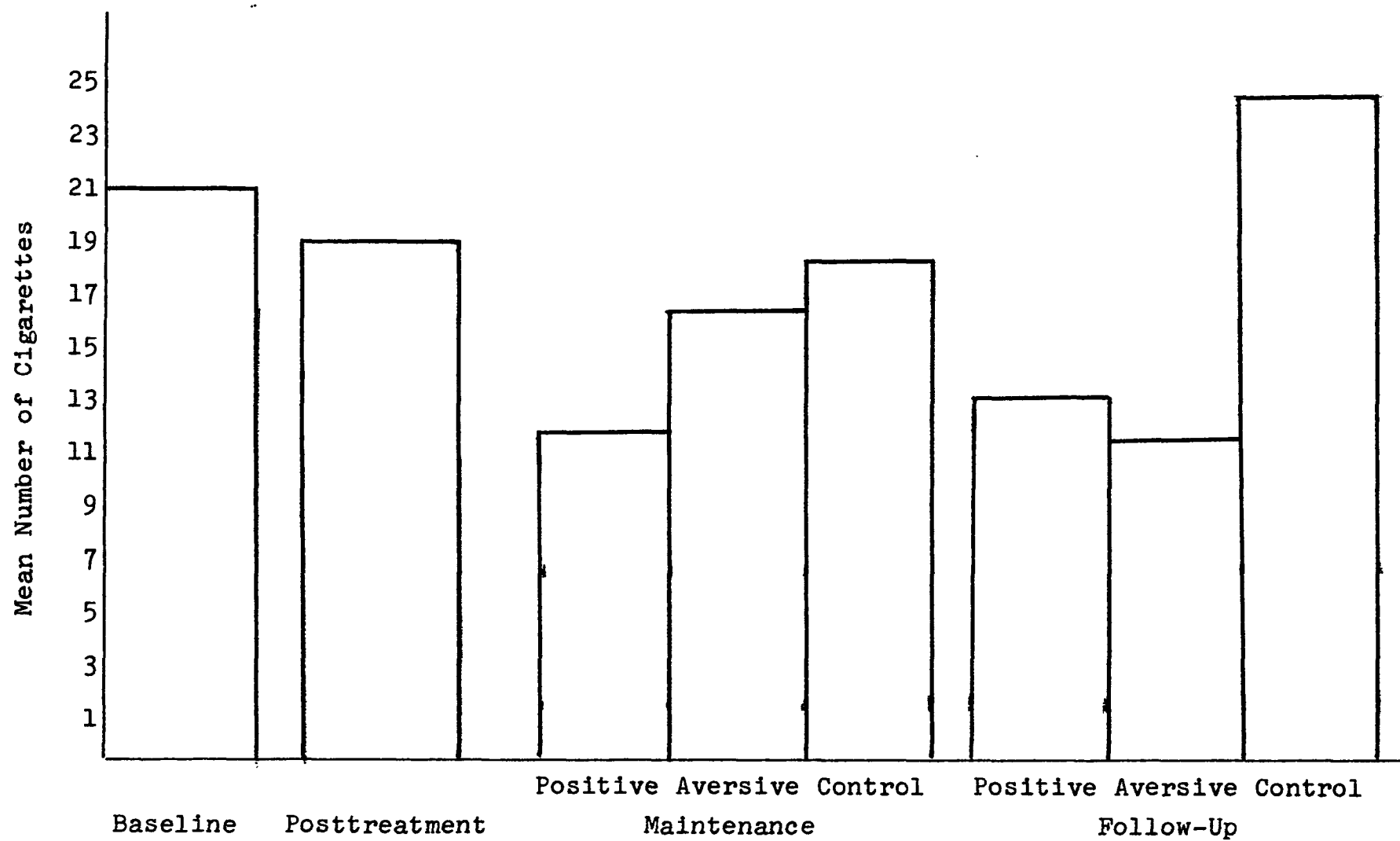


Fig. 5. Mean smoking behavior of control group over four data points.

procedure produced a lower smoking rate than the positive maintenance procedures.

Interpretation of Treatment Results

A basic question of this study was whether one combination of treatment and maintenance procedures would prove more effective than others in reducing smoking level. Unfortunately no significant combinations emerged from the analysis of data. Four of the five sub-questions posed by this study concerned the effects of various treatment and maintenance combinations on smoking behavior. However, the analysis revealed no differential effects of various treatment-maintenance combinations.

The fifth sub-question was concerned with the effect of treatment procedures on posttreatment smoking level. A one way analysis of variance did support the effectiveness of positive treatment procedures as compared to no treatment.

The analysis did show a significant reduction in smoking level from baseline across all groups. This lends support to the efficacy of combining various treatment and maintenance procedures to the modification of smoking behavior.

One unique finding from this study is the stability of the smoking rate for both the positive and aversive treatment groups over time. A number of comprehensive

reviews of the smoking literature have commented on the predictability of treatment results (Keutzer, Lichtenstein, & Mees, 1968; Bernstein, 1969; Schwartz, 1969; Hunt & Matarazzo, 1973). Each review comments on a common trend found in smoking research which shows a reduction in smoking level at the end of treatment followed by a gradual increase in smoking behavior. Hunt and Matarazzo (1973, p. 108) compiled evidence to demonstrate that the relapse rate reaches a peak three months after treatment and slowly continues to level off during the first year following treatment.

The data provided in this study do not conform to this expectancy. The overall mean level of smoking behavior remained fairly consistent over the three-month period following treatment. The mean smoking level following treatment for all groups was 14.1 and dropped to 12 at the data point following maintenance. This indicates that the smoking level for all groups actually decreased during the first month following treatment.

It is interesting to note that the three-month follow-up occurred just prior to the start of the final examination period. This fact makes the overall stability of the mean smoking rates even more impressive. It might have been expected that smoking would have increased significantly at this potentially stressful time. However, the mean increase in smoking level at follow-up was .5 cigarettes greater than that reported following maintenance.

The fact that the follow-up data point occurred prior to the examination period could lead to further speculation. The mean smoking level for the entire subject group was progressively lower at each of the first three data points: 21.08 at baseline, 14.15 following treatment, and 12.06 at post-maintenance. However, at the three-month follow-up the mean was 12.5. This slight (though not significant) increase in smoking level for all groups may have resulted from pressure brought on by final examinations.

The overall analysis of variance revealed no significant interactions among the treatment-maintenance combinations. Nevertheless, close inspection of the individual treatment-maintenance combinations yields some interesting findings. Three combinations demonstrated lower smoking levels at the treatment follow-up than had been reported in previous studies. Two recent studies using similar dependent measures reported daily smoking means ranging from 20.15 to 21.81 (Whitman, 1969) and 11 to 19.8 (Wagner & Bragg, 1970) at the three-month follow-up.

In this study the positive treatment-positive maintenance group had a mean smoking level at the three-month follow-up of 8 cigarettes. The three-month mean smoking levels for the aversive treatment-positive maintenance and aversive treatment-aversive maintenance groups were 15 and 11 respectively.

Since each treatment-maintenance combination had five subjects in a group any unusual characteristics in

smoking behavior by one individual influenced the final analysis. One subject in the no-treatment control-no-maintenance control group illustrates this point. This subject reported a baseline smoking level of 20 cigarettes and then unpredictably stopped smoking completely even though she received no treatment or maintenance procedures. All other subjects in this group actually increased their smoking level during the study.

The percentage reduction in smoking levels following treatment was not impressive in this study. The positive treatment group had a mean reduction of 54% as compared to 59% and 90.8% for the aversive treatment and no-treatment control groups respectively. Keutzer (1967) reported reductions ranging from 37.7 to 49.1%. Koenig and Masters (1965) found end of treatment reductions in the range of 42.1 to 51.6%. Schmahl, Lichtenstein, and Harris (1972) and Ober (1967) reported similar findings. Although Ober's reported reductions of 49, 57, and 58% for his three treatment groups approximate the reductions found in this study, he computed these reductions one month after treatment. One possible explanation for the lower percentage reductions found in the present study could be attributed to the variety of procedures included in each treatment package. Other studies have included fewer techniques, thus allowing for greater intensification of treatment procedures. The greater intensity of treatment procedures may account for the end of treatment reductions

reported in previous studies. However, it is possible that the wider array of procedures included in the present study contributed to the stability in smoking levels even though end of treatment reductions were not as dramatic as reported elsewhere.

The one-way analysis of variance computed on post-treatment smoking reduction yielded a significant F ratio (4.41). Post-hoc analysis showed the positive treatment group differed significantly in percentage of smoking reduction when compared to the aversive and no-treatment control groups. However, the three-way analysis of variance failed to support this finding. No main effects of treatment or interaction of treatment x time of measurement effects emerged. This discrepancy is partially explained by the different dependent measures used in each analysis. The one-way analysis of variance used percentage of smoking reduction. This controlled for variance in baseline reports. Each subject's baseline report was interpreted as 100% and the posttreatment reduction was a percentage of this figure. The three-way analysis used the mean number of cigarettes smoked daily as the baseline report. Unlike the one-way analysis, which had all subjects with the same baseline figure, the three-way analysis used baseline figures that varied among subjects. This variance on baseline levels could explain why the treatment x time of measurement interaction did not emerge. The baseline

report was one of the four levels of the time of measurement variable included in the analysis.

Since the three-way analysis of variance was a more complex statistical design the degrees of freedom within (subjects) was lower. As a result the power of this statistical test was lower.

Further, the main effect of treatment in the three-way analysis may have been confounded by the addition of the maintenance procedures. Some subjects in the no-treatment control group received maintenance procedures which lowered smoking rates reported following maintenance.

The fact that the aversive treatment package did not result in significant smoking behavior change has implications for anti-smoking programs. The control component of this package was fear arousal concerning the adverse effects of cigarette smoking. Unfortunately, most anti-smoking programs are directed toward this objective. This research study provides evidence opposed to this approach. If this approach is used it seems appropriate to provide positive suggestions for smoking modification along with fear information.

Lichtenstein and Keutzer (1973) have indicated that subject attrition rate is a common problem in smoking studies. However, the use of a contract in this study proved effective in reducing this problem. Each subject was requested to sign an agreement binding himself to

complete the requirements of the study. Only 2 of the original 47 subjects had to be dropped from the study. Both subjects were dropped from this study due to recording problems and not failure to attend sessions. Wilde (1969) reported the loss of 2 out of his original 7 subjects. Franks, Fried and Ashem (1966) lost 14 out of 23, Koenig and Masters (1965) lost 7 out of 42 and finally, Whitman (1969) had to drop 37 of 110 subjects due to failure to attend sessions.

There was a significant correlation between smoking reports filed by an informant and the subjects' own self-report ($r = .92, .96, \text{ and } .99$). This finding is consistent with other studies which reported coefficients of .9 or higher (Powell & Azrin, 1968; Ober, 1968; Steffy, Meichenbaum, & Best, 1969; Chapman, Smith, & Layden, 1971). The importance of accurate recording of smoking behavior was stressed throughout the study. Further, subjects were asked to indicate on their recording form any irregularities in the smoking report.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to compare the effectiveness of a combination of treatment and maintenance procedures designed to modify smoking behavior. Forty-seven subjects were assigned randomly to one of three groups: positive treatment, aversive treatment, and a no-treatment control. Each subject assigned to either the positive or aversive treatment group participated in four treatment sessions. The positive treatment package consisted of a variety of treatment techniques including: peer reinforcement, exploration of situational cues conducive to smoking, covert procedures, self-control development, and social reinforcement. The aversive treatment package emphasized fear role-playing, fear instruction, negative consequences of smoking, and covert sensitization.

One week following completion of the treatment phase of the study three maintenance groups were established. Subjects were assigned on a random basis to one of the three groups: positive maintenance, aversive maintenance, or no-maintenance control. Subjects assigned to either the positive or aversive maintenance groups received two maintenance sessions. The positive maintenance sessions

were devoted to procedures covered in the positive treatment group and the aversive maintenance sessions continued with techniques used in the aversive treatment group.

Data were collected at four points during the study: seven days prior to the start of treatment, after treatment, after maintenance and at a three-month follow-up. Mean daily smoking rates and a percentage of smoking reduction based on baseline reports served as dependent measures.

A one-way analysis of variance revealed a significant reduction in posttreatment smoking level for the positive treatment group. This analysis compared treatment groups at posttreatment on the basis of percentage reduction from baseline smoking levels.

A three-way analysis of variance using mean daily level of cigarettes found a significant effect of maintenance procedures and a time of measurement effect. Post-hoc interpretations found the positive maintenance procedures more effective in reducing smoking level than no maintenance.

It was determined that the posttreatment, post-maintenance and three-month follow-up smoking means for all groups differed significantly from the baseline reports. One unique finding from this study was the stability of the smoking level from posttreatment to the three-month follow-up conclusions.

Conclusions

The purpose of this study was to evaluate the effectiveness of a combined treatment and maintenance approach to smoking reduction. Within the limits of this study and in view of the findings contained in this report, these conclusions are presented:

1. Positive treatment procedures proved to be more effective at posttreatment in reducing smoking than no treatment.
2. Aversive treatment techniques were no more effective in reducing posttreatment smoking levels than the no-treatment control condition.
3. No combination of treatment and maintenance techniques provided significantly greater smoking reductions than other combinations.
4. Positive maintenance procedures resulted in greater smoking reductions than no-maintenance procedures.
5. Smoking levels for all groups differed significantly from baseline at posttreatment, after maintenance and at the three-month follow-up.
6. The use of a contract which required subjects to complete the study requirements proved effective in reducing subject attrition rate.

Recommendations

These recommendations are presented in light of the conclusions presented in this study and in view of the

insight and understanding gained as a result of conducting this study.

A study should be designed which explores the effect of maintenance procedures on smoking in more detail. A larger sample followed over a longer period of time would provide added information.

It might be advantageous to use one treatment method in combination with two separate maintenance procedures. This would provide for clearer interpretation of the maintenance effect.

Further, maintenance sessions could be offered at various time intervals during the study. This would provide information which may reveal that maintenance procedures are more effective at specific points after treatment. The number of maintenance sessions provided could be manipulated. It would be useful to know if two maintenance sessions are as effective as four or more sessions. A study providing insight into these issues would be worthwhile.

Some studies in the area of smoking modification require subjects to employ treatment techniques outside of the treatment sessions. It would be useful to investigate the extent to which these techniques are actually used. This would require some type of unobtrusive observation. Although the technical problems involved in such a project would be formidable, the results would be beneficial. Little information is available to verify the fact

that subjects actually employ specific techniques outside the treatment room.

The techniques used in this study could be developed into a self-employed program. Subjects could be given directions and explanations of treatment procedures in booklet form. Subjects using the self-employed program could then be compared with subjects receiving a more formal treatment program. Such a comparison could provide information about the influence of the group situation involved in the more structured program. In addition, it would demonstrate the efficiency with which these techniques can be self-employed.

One final suggestion for further research would be to duplicate the present study using more than one therapist. This would allow for an analysis of therapist effect. Also, the use of more than one therapist could add flexibility to the research design. It would be possible to extend the treatment phase of the study to include more than four sessions.

BIBLIOGRAPHY

- 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.
- Bergin, A. E. A self-regulation technique for impulse control disorders. Psychotherapy: Theory, Research, and Practice, 1969, 6, 113-118.
- Bernstein, A. Modification of smoking behavior: an evaluative review. Psychological Bulletin, 1969, 71, 418-440.
- Bernstein, A. The modification of smoking behavior: a search for effective variables. Behavior Research and Therapy, 1970, 8, 133-147.
- Borgatta, E., & Evans, R. Smoking, health and behavior. Chicago: Aldine Publishing Company, 1968.
- Cain, A. H. The cigarette habit: an easy cure. Garden City, New York: Doubleday, 1964.
- Campbell, K., & Spalding, W. J. A smokers' clinic follow-up. Medical Officer, 1967, 117, 95-96.
- Cautela, J. R. Treatment of compulsive behavior by covert sensitization. Psychological Record, 1966, 16, 33-41.
- 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, 255-264.
- Clarke, H. H., & Clarke, D. H. Advanced statistics: a supplement to research processes in physical education, recreation and health. Englewood Cliffs, N. J.: Prentice-Hall, 1971.
- Clawson, T. A. Hypnosis in medical practice. American Journal of Clinical Hypnosis, 1964, 6, 232-236.
- Dunn, W. Smoking behavior: motives and incentives. Washington, D. C.: V. H. Winston and Sons, 1973.
- Ferraro, D. Self-control of smoking: the amotivational syndrome. Journal of Abnormal Psychology, 1973, 81, 152-157.

- Fitch, K., Elliot, H. C., & Johnson, P. Life science and man. New York: Holt, Rinehart and Winston, Inc., 1973.
- Franks, C. M., Fried, R., & Ashem, B. An improved apparatus for the aversion conditioning of cigarette smokers. Behavior Research and Therapy, 1966, 4, 301-308.
- Frederickson, D. T. How to help your patient stop smoking. National Tuberculosis and Respiratory Diseases Association Bulletin, 1969, 55, 6-11.
- Freedman, J. L., Carlsmith, J. M., & Sears, D. Social psychology. Englewood Cliffs, N. Y.: Prentice-Hall, 1970.
- Furnas, J. C. So you're planning to stop smoking. New York: Simon and Schuster, 1938.
- Gerson, R., & Lanyon, R. I. Modification of smoking behavior with an aversive-desensitization procedure. Journal of Consulting and Clinical Psychology, 1972, 38, 399-402.
- Goldiamond, I. Self-control procedures in personal behavior problems. Psychological Reports, 1965, 17, 851-868.
- Gordon, S. Self control with a covert aversive stimulus: modification of smoking. (Doctoral dissertation, University of West Virginia) Ann Arbor, Mich.: University Microfilms, 1971, No. 72-05154.
- Greene, R. J. Modification of smoking behavior by free operant conditioning methods. Psychological Record, 1964, 14, 171-178.
- Grimaldi, K., & Lichtenstein, E. Hot, smokey air as an aversive stimulus in the treatment of smoking. Behavior Research and Therapy, 1969, 7, 275-283.
- Guilford, J. Group treatment versus individual initiative in the cessation of smoking. Journal of Applied Psychology, 1972, 51, 162-167.
- Gutmann, M., & Marston, A. Problems of S's motivation in a behavioral program for reduction of cigarette smoking. Psychological Reports, 1967, 20, 1107-1114.
- Harris, M., & Rothberg, C. A self-control approach to reducing smoking. Psychological Reports, 1972, 31, 165-166.

- Hays, W. L. Statistics for psychologists. New York: Holt, Rinehart and Winston, 1963.
- Homme, L. E. Control of coverants, the operants of the mind. Psychological Record, 1965, 15, 501-511.
- Horn, D., & Waingrow, S. Some dimensions of a model for smoking behavior change. American Journal of Public Health and the Nation's Health, 1966, 56, 21-26.
- Hunt, W., & Matarazzo, J. Recent developments in the experimental modification of smoking behavior. Journal of Abnormal Psychology, 1973, 81, 107-114.
- Ikard, 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.
- Janis, I. L., & Mann, L. Effectiveness of emotional role playing in modifying smoking habits and attitudes. Journal of Experimental Research in Personality, 1965, 1, 84-90.
- Kerlinger, F. Foundations of behavioral research. New York: Holt, Rinehart and Winston, Inc., 1965.
- Keutzer, C. S. Behavior modification of smoking: the experimental investigation of diverse techniques. Behavior Research and Therapy, 1968, 6, 137-157.
- Keutzer, C. S. Behavior modification of smoking: a review, analysis and experimental application with focus on subject variables as predictors of treatment outcome. (Doctoral dissertation, University of Oregon) Ann Arbor, Mich.: University Microfilms, 1967, No. 68-3994.
- Koenig, K. P., & Masters, J. Experimental treatment of habitual smoking. Behavior Research and Therapy, 1965, 3, 235-244.
- Kraft, R., & Al-Issa, I. Desensitization and reduction in cigarette consumption. Journal of Psychology, 1967, 67, 323-324.
- Lawton, M. P. Group methods in smoking withdrawal. Archives of Environmental Health, 1967, 14, 258-265.

- Leventhal, H. Fear communications in the acceptance of preventive health practices. Bulletin of the New York Academy of Medicine, 1965, 41, 1144-1168.
- Leventhal, H., & Watts, J. Sources of resistance to fear-arousing communications on smoking and lung cancer. Journal of Personality, 1967, 34, 155-175.
- Levinson, B., Shapiro, D., Schwartz, G., & Tursky, B. Smoking elimination by gradual reduction. Behavior Therapy, 1971, 2, 477-487.
- Lichtenstein, E. Smoking attitudes and intentions of college students and their relation to cognitive dissonance. Psychological Reports, 1967, 21, 425-430.
- Lichtenstein, E. Modification of smoking behavior: good designs--ineffective treatments. Journal of Consulting and Clinical Psychology, 1971, 36, 163-166.
- Lichtenstein, E. Comparison of rapid smoking, warm smoky air and attention placebo in the modification of smoking behavior. Journal of Consulting and Clinical Psychology, 1973, 40, 92-98.
- Lichtenstein, E., & Keutzer, C. Experimental investigation of diverse techniques to modify smoking: a follow-up report. Behavior Research and Therapy, 1969, 7, 139-141.
- Lichtenstein, E., Keutzer, C., & Himes, K. "Emotional" role-playing and changes in smoking attitudes and behavior. Psychological Reports, 1969, 25, 379-387.
- Logan, F. Self-control as habit, drive, incentive. Journal of Abnormal Psychology, 1973, 81, 127-136.
- Mahoney, M. Research issues in self-management. Behavior Therapy, 1972, 3, 45-63.
- Mann, L. The effects of emotional role playing on smoking attitudes and habits. (Doctoral dissertation, Yale University) Ann Arbor, Mich.: University Microfilms, 1965, No. 65-12970.
- Marston, A. R., & McFall, R. M. Comparison of behavior modification approaches to smoking reduction. Journal of Consulting and Clinical Psychology, 1971, 36, 153-162.

- Mausner, B. Some comments on the failure of behavior therapy as a technique for modifying cigarette smoking. Journal of Consulting and Clinical Psychology, 1971, 36, 167-170.
- Mausner, B. An ecological view of cigarette smoking. Journal of Abnormal Psychology, 1973, 81, 115-126.
- Mausner, B., & Platt, E. S. Behavioral aspects of smoking: a conference report. Health Education Monographs. New York: Society of Public Health Educators, 1966.
- Mausner, B., & Platt, E. Smoking: a behavioral analysis. New York: Pergamon Press, 1971.
- McCallum, R. The modification of cigarette smoking behavior: a comparison of treatment techniques. (Doctoral dissertation, University of Missouri) Ann Arbor, Mich.: University Microfilms, 1970, No. 71-08360.
- McFall, R. The effects of self-monitoring on normal smoking behavior. Journal of Consulting and Clinical Psychology, 1970, 35, 135-142.
- McFall, R., & Hammen, C. L. Motivation, structures, and self monitoring. Role of nonspecific factors in smoking reduction. Journal of Consulting and Clinical Psychology, 1971, 37, 80-86.
- McFarland, J. W. The five day plan. Paper presented at the National Conference on Smoking and Health. San Diego, Calif., September, 1970.
- McFarland, J. W., Gimbel, H. W., Donald, W. A., & Folkenberg, E. J. The five day program to help individuals stop smoking. Connecticut Medicine, 1964, 78, 880-890.
- Miller, A., & Gimpl, M. Operant conditioning and self-control of smoking and studying. Journal of Genetic Psychology, 1971, 119, 181-186.
- Mozer, M. The intensive application of self-control procedures in the reduction of smoking. (Doctoral dissertation, University of Montana) Ann Arbor, Mich.: University Microfilms, 1972, No. 72-33062.
- National Interagency Council on Smoking and Health. World conference on smoking and health: a summary of the proceedings. New York: American Cancer Society, 1967.

- Nolan, J. D. Self-control procedures in the modification of smoking behavior. Journal of Consulting and Clinical Psychology, 1968, 32, 92-93.
- Ober, D. C. The modification of smoking behavior. (Doctoral dissertation, University of Illinois) Ann Arbor, Mich.: University Microfilms, 1966, No. 68-01821.
- Pflaum, J. Smoking behavior: a critical review of research. Journal of Applied Behavioral Science, 1965, 1, 195-209.
- Powell, J., & Azrin, N. The effects of shock as a punisher for cigarette smoking. Journal of Applied Behavior Analysis, 1968, 1, 63-71.
- Premack, D., & Anglin, B. On the possibilities of self-control in man and animals. Journal of Abnormal Psychology, 1973, 81, 137-151.
- Pumroy, D., & March, B. A. The evaluation of a cigarette smoking reduction method. Paper presented at the Eastern Psychological Association Meeting, 1966.
- Pyke, S., Agnew, N. McK., & Kopperud, J. Modification of an overlearned maladaptive response through a relearning program: a pilot study on smoking. Behavior Research and Therapy, 1966, 4, 197-210.
- Resnick, J. H. The control of smoking behavior by stimulus satiation. Behavior Research and Therapy, 1968, 6, 113-114.
- Sachs, L., Bean, H., & Morrow, J. Comparison of smoking treatments. Behavior Therapy, 1970, 1, 465-472.
- Schmahl, D., 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. A critical review and evaluation of smoking control methods. Public Health Reports, 1969, 84, 483-506.
- Shapiro, D., Tursky, B., Schwartz, G., & Schnidman, S. Smoking on cue: a behavioral approach to smoking reduction. Journal of Health and Social Behavior, 1971, 2, 108-113.

- Shryock, H. Mind if I smoke? Mountain View, California: Pacific Press Publishing Association, 1965.
- Steffy, R., Meichenbaum, D., & Best, J. A. Aversive and cognitive factors in the modification of smoking behavior. Behavior Research and Therapy, 1970, 8, 115-125.
- Sushinsky, L. Expectation of future treatment, stimulus satiation and smoking. Journal of Consulting and Clinical Psychology, 1972, 39, 343.
- Thompson, D. S., & Wilson, T. R. Discontinuance of cigarette smoking: natural and with therapy. Journal of the American Medical Association, 1966, 196, 1048-1052.
- Tighe, T. J., & Elliott, R. A technique for controlling behavior in natural life settings. Journal of Applied Behavior Analysis, 1968, 1, 263-266.
- Tooley, J. T., & Pratt, S. An experimental procedure for the extinction of smoking behavior. Psychological Record, 1967, 17, 209-218.
- Wagner, M. K., & Bragg, R. A. Comparing behavior modification approaches to habit decrement--smoking. Journal of Consulting and Clinical Psychology, 1970, 34, 258-263.
- Watts, J. C. The role of vulnerability in resistance to fear-arousing communications. (Doctoral dissertation, Bryn Mawr College) Ann Arbor, Mich.: University Microfilms, 1967, No. 68-04699.
- Whitman, T. Modification of chronic smoking behavior: a comparison of three approaches. Behavior Research and Therapy, 1969, 7, 257-265.
- Wilde, G. J. S. Behavior therapy for addicted cigarette smokers: a preliminary investigation. Behavior Research and Therapy, 1964, 2, 107-109.
- Winer, B. J. Statistical principles in experimental design. New York: McGraw-Hill Book Company, 1971.
- Winett, R. Parameters of deposit contracts in the modification of smoking. Psychological Record, 1973, 23, 49-60.
- Zagona, S. Studies and issues in smoking behavior. Tucson: The University of Arizona Press, 1966.

APPENDICES

APPENDIX A
Individual Subject Smoking Level by Groups
(Cigarettes per day)

Group	Baseline	Post-treatment	Post-maintenance	Follow-up
Positive-Positive	20	8	10	10
	18	12	15	6
	28	21	3	7
	16	2	6	4
	19	12	13	15
Positive-Aversive	16	9	10	10
	26	18	21	16
	17	14	8	12
	20	13	13	20
	19	3	5	5
Positive-Control	23	6	10	16
	26	20	26	25
	12	28	0	0
	27	27	19	17
	45	19	17	1

Group	Baseline	Post- treatment	Post- maintenance	Follow- up
Aversive-Aversive	25	7	15	20
	16	9	9	14
	20	0	12	8
	25	0	0	0
	19	8	10	14
Aversive-Positive	26	23	0	0
	8	12	11	9
	11	0	0	0
	21	10	0	5
	16	13	7	10
Aversive-Control	35	21	21	22
	14	12	15	15
	22	6	16	21
	19	30	7	15
	28	12	20	16

Group	Baseline	Post- treatment	Post- maintenance	Follow- up
Control-Positive	17	18	18	18
	15	10	0	10
	24	24	20	25
	24	25	10	0
	10	10	10	10
Control-Aversive	20	18	12	8
	41	36	37	20
	11	8	8	8
	15	16	12	6
	18	17	9	11
Control-Control	22	30	24	30
	32	32	23	40
	20	0	2	0
	21	21	18	23
	20	22	21	24

APPENDIX B

**Means and Standard Deviations by Groups Following
Treatment, After Maintenance and at Three-
Month Follow-Up
(Cigarettes per Day)**

Means and Standard Deviations for Positive Treatment
Group Following Treatment, After Maintenance
and at Three-Month Follow-Up

Maintenance Group	Following Treatment		After Maintenance		3-Month Follow-Up		Total	
	\bar{X}	s	\bar{X}	s	\bar{X}	s	\bar{X}	s
Positive	11	6.19	9.4	4.94	8.4	3.82	9.6	5.03
Aversive	11.4	5.08	11.4	5.4	12.6	5.12	11.8	1.90
Control	15	9	14.4	8.82	11.8	9.74	13.73	9.32
Total	12.46	7.22	11.73	6.83	10.96	4.90	11.71	7.03

Means and Standard Deviations for Aversive Treatment
Group Following Treatment, After Maintenance
and at Three-Month Follow-Up

Maintenance Group	Following Treatment		After Maintenance		3-Month Follow-Up		Total	
	\bar{X}	s	\bar{X}	s	\bar{X}	s	\bar{X}	s
Positive	11.6	7.34	3.6	4.58	4.8	4.26	6.66	6.59
Aversive	4.8	3.96	9.2	5.03	11.2	6.76	8.4	6.0
Control	16.2	8.4	15.8	4.95	17.8	3.05	16.6	5.96
Total	10.86	8.29	9.53	6.96	11.26	7.26	10.55	7.55

Means and Standard Deviations for No-Treatment Control
Group Following Treatment, After Maintenance
and at Three-Month Follow-Up

Maintenance Group	Following Treatment		After Maintenance		3-Month Follow-Up		Total	
	\bar{X}	s	\bar{X}	s	\bar{X}	s	\bar{X}	s
Posi- tive	17.4	6.5	11.6	7.08	12.6	8.42	13.86	7.81
Aver- sive	19	9.2	15.6	10.81	10.6	4.96	15.06	9.45
Control	21	11.34	17.6	8.06	23.4	13.16	20.66	11.33
Total	19.13	9.82	14.93	9.15	15.53	11.17	16.52	10.05

APPENDIX C

Summary of Means and Standard Deviations Over All
Data Points for Each Combination of
Treatment and Maintenance Groups
(Cigarettes per Day)

Combination	N	\bar{X}	s
Positive Treatment-Positive Maintenance	5	12.25	6.65
Positive Treatment-Aversive Maintenance	5	13.75	4.34
Positive Treatment-Control Maintenance	5	16.95	11.27
Aversive Treatment-Positive Maintenance	5	9.1	7.80
Aversive Treatment-Aversive Maintenance	5	11.55	7.84
Aversive Treatment-Control Maintenance	5	18.35	6.81
Control Treatment-Positive Maintenance	5	14.9	7.56
Control Treatment-Aversive Maintenance	5	16.55	10.07
Control Treatment-Control Maintenance	5	21.25	10.11
Total	45	14.96	9.02

APPENDIX D

Data from Subject Self-Report Reliability Check

Check on Baseline Report

Baseline Report	Questionnaire Estimate
22	20
20	20
20	20
16	15
21	20
19	10
17	17
27	20
12	15
16	15
14	17
27	17
19	20
19	17
34	30

Posttreatment Reliability Check

Subject Report	Informant Report
7	7
7	6
3	3
10	8
1	1
0	0
8	8
8	4

Post-Maintenance Reliability Check

Subject Report

Informant Report

3	3
0	0
8	6
7	5
5	5
6	6
26	18
5	4
1	1
5	4

Follow-Up Reliability Check

Subject Report

Informant Report

10	6
6	6
6	5
11	9
17	15
15	11
7	7
1	1
0	0
5	3

APPENDIX E
Questionnaire Used to Recruit Subjects

Do you smoke cigarettes? _____

If so, how many each day? _____

How long have you been smoking? _____

Do your parents smoke? _____

Would you be interested in participating in a study
designed to assist you in modifying your smoking behavior
if such a study required a maximum of six sessions? ____

Name: _____

Campus Address: _____

Campus Phone: _____

APPENDIX F
Student Contract

I agree to participate in the smoking modification study and will provide the data requested at four specific times during the study. I am aware of the purpose of the study and plan to complete the requirements as stated by the experimenter.

Signature

APPENDIX G
Baseline Report Form

Name _____

I would appreciate your keeping an adequate tally of your smoking behavior for at least four days. The overall success of the present study depends on an adequate baseline recording of your pre-experimental smoking behavior.

It will be necessary for you to keep track of each cigarette smoked during your baseline recording. Simply make a tally for each cigarette smoked. This record is a process whereby the experimenter can determine the effects of the various techniques used in the study.

Use the form below for your recording and turn it in at the time of our first treatment session. The first three spaces are provided for you to estimate what your consumption of cigarettes was daily prior to your actual recording. Therefore, your tally sheet contains seven spaces, three for estimates of your pre-baseline recordings and four for your actual tallies. It is important that you record your present smoking behavior--Don't attempt to modify your smoking.

Estimate 3 days prior to baseline _____

Estimate 2 days prior to baseline _____

Estimate 1 day prior to baseline _____

1st day of baseline _____

2nd day of baseline _____

3rd day of baseline _____

4th day of baseline _____

APPENDIX H

Instructions for Fear Role-Playing Situation

Today we are going to attempt negative role playing as a method designed to enhance smoking reduction. You will be working in pairs, with one member being a physician and the other the patient. The physician will be discussing the results of extensive examinations conducted on the patient which all lead to one conclusion--lung cancer.

The physician will advise that treatment begin at once and that the patient stop smoking now. Improvise the situation as best you can utilizing information presented in the film strip and film. TRY TO PUT YOURSELF IN THE ROLE. Make it as realistic as possible.

APPENDIX I

Statements on Advantages Gained from Not Smoking

At each session you will be given three positive statements concerning the benefits of not smoking. These statements should act as partial reinforcers for not smoking. Every day, after you have gone several hours without a cigarette, read and re-read the statements.

People, especially non-smokers, are not at all equivocal about being close to you. Your clothes, your hair, your breath don't contain that heavy oppressive residue of living in smoke.

You'll be surprised how much people appreciate and respect you for kicking the habit, especially when they know how strongly it held you for so long.

A good brisk walk is a good substitute for a cigarette, again breathing deeply of the less-polluted air. Before, when you walked, you carried your own personal air pollutor.

You can enjoy the unmitigated joy of deeply breathing good clean air into your lungs. Much of the pleasure thought to derive from smoking is simply the deeper-than-usual breathing that accompanies smoking sometimes. This breathing is much more satisfying "deep down" without the contaminants. Try it. When you feel the need to smoke breathe deeply, slowly and remind yourself that all that you put into your lungs this time is good for you and it feels even the better for it.

I think it is a good policy that when you feel the urge to smoke, do things that are very incompatible with smoking such as things that confirm a sense of physical stamina and that put you in touch with how good it is to live, to live without stifling health problems (especially breathing problems).

Just before going to bed put the amount of money you would have otherwise spent on cigarettes in a clear glass jar with a slot cut in top. Buy yourself whatever your heart desires as you accrue enough money to do it: little or big. Indulge yourself with your savings. It is money you would not have otherwise had, and God knows, you deserve it.

You'll be absolutely amazed to find how much time becomes available because you're not smoking. You thought you were working while smoking. Maybe you were but not nearly as much as you thought.

It now makes sense to improve your physical condition in other ways. As long as you were smoking you had to ask yourself "just how much good is exercise going to really do as long as I am sabotaging my whole pulmonary and circulatory system with smoke."

You don't have to check before going out, going to bed, etc. about your cig. supply, matches, etc. Even if all of the tobacco factories close tomorrow you'd survive. You weren't too sure about that before.

More freedom to do things spontaneously, don't have to wait until you finish this cigarette or not be able to go places or do things that don't allow you to smoke. You can even play with little kids for more than five minutes at a time now.

Reward yourself for not smoking with whatever non-carcinogenic stimulation you find available that will not itself lead to other problems.

Most importantly, you perceive yourself so much differently. By God, you're right too, you are a MORAL GIANT!!!

APPENDIX J

Summary of Pamphlets Used in Aversive Maintenance Group

Three pamphlets were used in the aversive maintenance procedure. Each is summarized below:

What's Your Cigarette Smoking I.Q.? National Tuberculosis and Respiratory Disease Association, 1970.

This pamphlet contains a ten-item test that evaluates the subject's understanding of the health consequences of smoking. Answers to the questions are provided and emphasis is placed on the risk for smokers of developing certain chronic diseases.

To Smoke or Not to Smoke? American Cancer Society, 1962.

This pamphlet presents facts and statements from a number of leading health authorities concerning the dangers of cigarette smoking. Emphasis is placed on detailing research which relates cigarette smoking to a number of health problems.

Facts: Smoking and Health. United States Department of Health, Education and Welfare, 1971.

A detailed pamphlet containing charts, figures and statistical information on the dangers of smoking. A summary of research from animal, clinical and survey studies is included.