

were reporting abstinence. However, self-reports were not validated, and if one assumed that nonresponders were smoking, the success rate based on all subjects completing treatment would be only 23 percent (22 of 96). Some success has been noted utilizing contingency contracting as a maintenance aid within a broad-spectrum program (210). In sum, as a single technique, contingency contracting appears able to initiate some behavioral changes, and when used in combination with other procedures, to prevent relapse.

Other Self-Control Strategies

Several other techniques or procedures have been modified for treatment of smoking behavior. Systematic desensitization was one procedure that was adapted for use with smokers under the rationale that reducing the need for stress-related cigarettes would aid subjects in coping with cessation. Again, while the technique was theoretically attractive, long-term abstinence rates were unimpressive (96, 200, 205, 215, 263, 301, 426). Similarly, a direct test of meditation proved to be equivocal (287).

In a similar vein, the suggestions of Homme (163) have produced a number of treatments attempting to increase self-control over smoking. Homme focused on "covert operants" which were designed to be incompatible with smoking behavior. He also reinforced non-smoking alternatives. However, only temporary treatment effects were produced in control trials (125, 188, 199, 212), despite some clinical demonstrations (416). Several other studies tried some combination of techniques along these lines with only minimal success (38, 120, 281).

Aversion Strategies

Techniques designed to reduce the probability of smoking through the use of aversive stimuli have been very commonly utilized in behavioral research projects. The theoretical underpinnings of individual procedures remain only partially delineated, and different theoretical positions—such as operant versus classical conditioning perspectives (12, 14, 106)—can result in varying treatment predictions (26, 226). Possibly due in part to this lack of theoretical precision, early research on aversive strategies produced mixed results (107, 135, 201, 279, 313, 326, 327, 435, 436, 437). Continuing refinements and evaluations have led to more elaborate combinations that appear more effective.

Aversive control procedures can most easily be categorized according to the major stimuli used: electric shock, covert sensitization, or cigarette smoke. All but two studies (242, 434) reporting minimal long-term results for taste aversion fit easily into these categories. The three major stimuli have rarely been used in combination with each other, but more recently have been included in multicomponent packages that include aversion and self-control strategies. For clarity,

the research on the aversive control procedures applied in isolation will be examined first.

Electric Shock

Previous reviews (24, 200, 230) of early studies (201, 279, 313, 435) concluded that it was most likely that laboratory administered shock was ineffective because humans were too capable of discriminating between shock and no-shock situations. Thus, in spite of encouraging case study data (338), controlled experiments have failed to produce impressive long-term results (20, 32, 64, 220, 350, 394) or even superiority over attention-placebo controls (20, 64, 350). The nondifferential results from contingent and noncontingent shock conditions in the study by Russell and his collaborators (350) suggested that "traditional conditioning processes do not contribute significantly to the clinical response of human subjects to electric aversion therapy for cigarette smoking" (p. 103).

Some positive results are noteworthy, however. Berecz (21, 22) has presented interesting case study data suggesting that shocking imaginal urges rather than actual smoking may be more effective. Chapman and his colleagues (58) combined daily shock sessions with intensive self-management training to produce reported abstinence in 6 of 11 (54.5 percent) of the participants at a 12-month follow-up. Dericco, et al. (85) produced a clear treatment effect for electric shock therapy. Sixteen of twenty (80 percent) of the subjects receiving shock were abstinent at 6-month follow-ups with validation by informants. The treatment involved sessions 5 days per week for several weeks, with higher than normal shock intensities and the additive influence of other treatment factors. Thus, these results do not refute the basic conclusion of past reviewers that shock augmented by other procedures may produce an effective treatment package, although as a sole treatment it fails because the effects often do not generalize outside therapy (200, 226, 230).

Covert Sensitization

Cognitive processes have been commonly employed to produce aversion by pairing smoking with vivid images of extreme nausea or other unpleasant stimulation. This procedure of covert sensitization showed promise in case studies (57, 416), but experimental studies involving various types of control conditions or treatment comparisons have failed to produce either meaningful levels of long-term abstinence or superiority over controls (14, 118, 212, 236, 249, 268, 280, 315, 355, 384, 426, 431, 447). However, it has been suggested as a maintenance strategy (29), and variants of the technique have been utilized in the more elaborate multicomponent treatments to be discussed later.

Cigarette Smoke Aversion

The choice of cigarette smoke as the aversive stimulus in smoking treatment may be particularly appropriate because: (1) the reinforcing aspects of almost any stimulus are reduced if presented at sufficiently increased frequency or intensity, and (2) the aversion affects many of the endogenous cues that characterize smoking (26, 226). Several main versions of this approach have been used: satiation (that is, doubling or tripling the daily consumption of cigarettes) prior to abstinence; and aversive conditioning through either smoking with warm, stale smoke blown into the face, or rapidly smoking with inhalations every 6 seconds.

Early research using artificially produced warm, stale smoke to affect aversion showed impressive initial results (436) followed by total failure during follow-up (437). Other early studies also produced minimal or no long-term successes (107, 135). However, in a subsequent study with the warm, smoky air apparatus, Schmahl and his colleagues (362) produced both 100 percent termination abstinence and an impressive 57 percent (16 of 28) abstinence rate at 6-month follow-up, verified by random checks with informants. In the treatment, subjects were required to smoke rapidly (inhaling every 6 seconds) and continuously while facing into the blown smoke until further smoking could not be tolerated. Sessions were scheduled until the subject was abstinent a minimum of 24 hours and felt confident in maintaining abstinence (mean of about eight sessions).

A well controlled replication against a normal-paced, smoking attention-placebo control found 60 percent (18 of 30) abstinence among three experimental conditions at 6-month follow-ups, but only 30 percent (3 of 10) abstinence in the control (229); this was again verified by random checks of informants. As the rapid-smoking-only condition was as successful as the more involved procedures, abandonment of the inconvenient smoke blowing apparatus was recommended (229). Subsequent early research by Lichtenstein and his colleagues was also highly effective (226). The logic and supporting data for the procedure have been considered in more detail by Lichtenstein and Danaher (226).

Owing in part to the early effectiveness, convenience, and simplicity of the rapid smoking procedure, it became increasingly popular (72, 226). Subsequent results are mixed and variable (72), however. A multiyear follow-up of the early studies has shown that some relapse did occur over the intervening years (232). Danaher (72) recently has comprehensively reviewed the existing data on the procedure and documented that termination and follow-up abstinence rates varied widely in subsequent research, with some studies reporting minimal or no (0 to 29 percent abstinence) long-term successes (94, 122, 127, 206, 215, 409), others with moderate (30 to 49 percent abstinence) success (28, 31, 104, 202, 207, 209, 276, 292, 325, 452), and a few approximately replicating the follow-up data of early studies (71, 94, 144, 246).

Danaher (72) has attempted to clarify these data by highlighting the departures from original treatment procedures by the use of group presentation (94, 127, 206, 209, 215, 246, 276, 292, 325, 452), limiting the number of sessions (usually to six) (123, 127, 202, 276, 292, 325), offering treatment on a rigid or fixed schedule (28, 71, 94, 123, 127, 202, 276, 292, 325, 409), and omitting the contingently warm, supportive treatment context (94, 206, 207, 209). The most impressive recent outcome data have been produced with multicomponent approaches combining aversion and self-control procedures (28, 31, 94, 144, 246). Nevertheless, it is important to note that several multiple case studies and controlled studies on the rapid smoking procedure failed to demonstrate any improvement with the addition of self-control procedures (70, 71, 123, 292).

Thus, the rapid-smoking procedure appears to be a potentially very effective but complex intervention, dependent both upon the subject's active revivification of the aversion (12, 226, 246) and upon critical elements in the format, including a warm, personal client-therapist relationship offering social reinforcement and positive expectations (72, 88, 226, 246) and flexible or individualized treatment scheduling to insure total abstinence prior to treatment termination (72, 226). Numerous nonreplications and one direct test (276) have demonstrated that the production of only physiological aversion and conditioning effects are insufficient to produce long-term abstinence.

Satiation

Early research (436, 437) on the satiation technique was encouraging, with a 63-percent reported abstinence at 4-month follow-up. The success was partially replicated in a slightly modified, marathon format (240), but the weight of evidence on the procedure has been negative since that time. Controlled studies were unable to replicate the impressive cessation data or even to demonstrate superiority to control groups (59, 211, 408). Other comparative tests have also produced negative results (32, 207, 242, 249, 280). While the procedure as a sole treatment may have questionable effectiveness, more recent studies (28, 31, 80, 210), combining satiation with multicomponent treatment packages, have reported more impressive results.

Medical Risks of Aversive Smoking

Because the smoke-aversion procedures were developed to induce a degree of physiological discomfort by excessive smoking, the cardiopulmonary stress of increased nicotine and carbon monoxide exposure has been noted with concern, especially with regard to rapid smoking (156, 164, 165, 223). A number of studies have been undertaken to quantify the impact of rapid smoking on the cardiovascular system (73, 78, 79, 144, 174, 261, 354); much of the data has been summarized by

Lichtenstein and Glasgow (228). Recent studies by Hall and associates (144, 354) and Miller and associates (261) have documented that the rapid smoking procedure produces an acute and dramatic effect upon vital signs (respiratory rate, heart rate, and blood pressure), blood gases, and COHb saturations, which make the procedure contraindicated for individuals with potential or active cardiovascular or pulmonary diseases. Adequate medical screening of potential treatment participants has been strongly recommended (144, 156, 223, 261, 354).

Data have yet to be published on the relative risks of other smoke-aversion procedures. If heavy-smoking subjects double or triple their daily smoking consumption during the satiation procedure, notable acute effects on the cardiovascular system may also occur. It should be noted that in excess of 35,000 participants have been exposed to the rapid-smoking procedures, with an informally reported morbidity rate from nonspecific complications of about 0.023 percent and no reported mortality (228). Yet, until the relative risks of procedures have been adequately researched, all the smoke aversion procedures should be used with appropriate screening and monitoring (144, 156, 228, 261, 354).

Less Stressful Alternatives

The identification of the relative risks of the rapid smoking procedure has stimulated the development of smoke aversion interventions that involve less physiological stress. Because of the pattern of 20 to 30 percent long-term abstinence with a common normal-paced attention-placebo condition (71, 123, 202, 206, 207, 209, 211, 229), which self-control training seemed to enhance (71), initial clinical demonstrations have been undertaken combining normal-paced "focused" smoke aversion within broad, multicomponent treatment packages (74, 141). Preliminary demonstration data showed that a 6-month abstinence could be produced in approximately 50 percent (5 of 10) of the participants (141). A controlled test of a rapid-puffing-sans-inhalation procedure produced somewhat less optimistic results with only 6 of 21 (29.6 percent) of the participants who started treatment reporting abstinence at the 3-month follow-up; this was verified by random checks of informants (292). A recent report by Tori (417) found that a smoke-induced taste-aversion technique involving limited smoke inhalation produced reported abstinence in 17 of 25 (68 percent) of the participants versus 6 of 10 (60 percent) in a rapid smoking condition at a 26-week follow-up. Unfortunately, assignment to treatment was not random, abstinence reports were not validated, subjects were treated on a fee basis, and a variety of adjuncts including hypnosis were utilized as maintenance boosters. Nevertheless, this and other early data (74, 141, 292) on alternatives to rapid smoking involving similar treatment formats, rationales, and nonspecifics, but markedly reduced

physiological stress, appear encouraging and worthy of additional controlled research.

Multicomponent Interventions

As noted above, the research on techniques and procedures derived from learning theories and models has been mixed and often inconclusive. As recommended by early reviewers of the behavioral literature (24, 366), treatment packages combining multiple techniques are beginning to emerge. These comprehensive programs utilize some combination of the behavioral self-control techniques, and many also integrate aversive control procedures. The technology in this area is still developing; the early mixed results are to be expected. Still, recent reviews have uniformly concluded that the data from this emerging trend in programming are clearly encouraging (26, 29, 226, 245).

Treatment packages using behavioral self-control strategies alone have not produced notably effective results. Several complex programs have produced minimal long-term effects (48, 104, 115, 255, 381, 382). The later successes of Pomerleau and associates (308) and Brengelmann (44, 45) only came with refinements based on systematic developmental research. The most recent successful reports (28, 31, 44, 45, 210, 246, 308) thus appear to be a product of practical and in-depth knowledge of the problem which guides the application of the diverse elements in the treatment programs. Early and more recent successes (28, 31, 39, 44, 45, 58, 80, 94, 140, 142, 210, 246, 308, 407) suggest that planned extended contacts plus adaptation of techniques to individual needs are necessary for long-term success.

In a carefully evaluated clinical demonstration, Pomerleau and associates (308) reported success in 61 of the first 100 participants with 32 remaining abstinent (these were verified by urinary nicotine assays at 1-year post-treatment). Brengelmann (42, 45) has refined his complex treatment package (42) to the point where current results with treatment-by-mail are equal to face-to-face therapy, with 55 to 67 percent of the participants who complete treatment (86 percent reported completion rate) reporting abstinence at termination and 57 percent of those responding to follow-up reporting continued, but unverified, abstinence. Although the success rate based on the assumption that nonresponders were smoking would be 23 percent, the efficiency of the approach is clearly encouraging.

Other multicomponent treatments utilizing an aversion procedure to help induce cessation have also produced initially mixed but encouraging data. The early multiple case study of Chapman and associates (58) with electric shock plus extended self-management training is an often-cited example of this type of approach. In recent clinical evaluations of delivery formats, Best and associates (28, 31) have also documented the potential efficacy of a multicomponent program involving aversive smoking (satiation and rapid smoking) plus

behavioral self-control training. Abstinence rates at 6 months, verified by informant reports, have varied from 35 to 55 percent, with the best results in a take-home version involving minimal personal contact. In a controlled study of satiation plus self-control training, Delahunt and Curran (80) demonstrated the superiority of the multicomponent treatment over controls and individual components. Six-month abstinence data showed five out of nine subjects (56 percent) for the combined treatment, but only 0 to 22 percent for individual components and controls; self-report validity was enhanced by collected but unanalyzed saliva for thiocyanate assays. Elliott's (94) package of rapid smoking, self-control strategies, covert sensitization, and systematic desensitization likewise produced abstinence, verified by a bogus marketing survey, in 45 percent (9 of 20) of the participants at 6-month follow-up, versus 17 percent for rapid smoking only and 12 percent for attention-placebo control. McAlister (246) demonstrated that his multicomponent rapid-smoking package was equally effective at 3-month follow-up presented either in person (56 percent or 5 of 9 abstinence) or over television (62.5 percent or 5 of 8 abstinence), with self-reports validated by thiocyanate assays.

These very positive findings are tempered somewhat by several less successful combinations of self-control and aversive smoking procedures (27, 71, 123, 292). The analytical study of the multicomponent approaches by Flaxman (104) provided some data on the complexity of the issues involved. Although the study indicated that subjects who abruptly quit on a selected date after self-control training reported the best 6-month abstinence data either with subsequent aversive smoking (5 of 8 or 62.5 percent) or only supportive counseling (4 of 8 or 50 percent), gradual reduction strategies, especially for male subjects, were markedly less effective with or without aversive smoking. Though the cell frequencies were small and the abstinence data unverified, the results suggest that successful response to multicomponent treatments may be the product of many only partially understood variables.

Treatment Innovations

Older (371) and more recent (119) survey data clearly indicate that most smokers who are motivated to quit are less interested in formal programs than in do-it-yourself methods. The broadening of the mode of service delivery of behavioral treatments is thus another encouraging trend. A study by Dubren (90) suggested that brief interventions by television can produce small but meaningful abstinence rates on the order of 9 to 10 percent. He also demonstrated that taped telephone messages can be used to extend the intervention and support maintenance (91). McAlister's (246) experimental demonstration of the potential of the media-only treatment group was impressive. Rosen and Lichtenstein (339) evaluated a program independently developed

by the employer. They reported encouraging results using the resulting monetary contingency technique. These preliminary studies suggest that the best of the behavioral technology could be made available effectively by media or at the worksite to those smokers unwilling to attend formal programs.

The basics of successful clinical programs have also been reduced to self-study books (310, 72a). Consistent with the growing trend toward self-administered treatments (124), multicomponent treatments based on behavioral self-control strategies with or without aversive smoking techniques (310, 72a) are now available in self-study formats. Although initial tests of the self-study approach to smoking cessation are mixed (28, 31, 123, 202), their availability should facilitate further testing of programs similar to the successful self-managed clinic reported by Best and associates (28, 31).

Controlled Smoking

Most smokers want to reduce their risks from smoking (49, 347); this is evidenced by the dramatic changes that have occurred in the types of cigarettes being smoked (151, 270, 287, 345). Filter cigarettes are now the norm, and both the tar and nicotine content of the American cigarette have declined significantly (279, 412). These natural trends and apparent high interest among smokers in safer smoking have stimulated only preliminary interest in the development of interventions to maximize the reduction of risks (49, 287, 347). Frederiksen and associates (108-112), however, have pursued the topic and have experimentally demonstrated that exposure level can be controlled not only by rate of smoking and strength of cigarette, but also by altering the topography of the habit. They demonstrated that modifying the topography of smoking involves changing how much smoke is inhaled, how many puffs per cigarette are taken, and how much of each cigarette is smoked (109, 110, 112). Although the technology is still in the clinical-developmental stage, and the long-term stability of the changes will need to be verified, initial single-case demonstrations are encouraging and merit more emphasis. Data from the stimulus control studies suggest that reduction in exposure may be limited by the floor effect of 10 to 12 cigarettes per day (8, 10, 23, 59, 104, 139, 221, 242, 313, 377).

The controlled smoking technology may be useful to other groups of individuals. Physiological monitoring of ex-cigarette smokers who shift to pipes and cigars has documented that inhalation does occur (81, 82, 351). Because the inhalation may occur at an unconscious level and can lead to tobacco exposures as great as cigarette smoking, such smokers may need specific behavioral training to control the topography of their new habits. Similarly, some smokers who shift to lower tar and nicotine cigarettes to reduce their risk may also require the controlled

smoking technology to avoid increases in rate or attempts to compensate by altering the smoking topography.

Maintenance of Nonsmoking

Both early (24, 200, 366) and more recent (26, 29, 40, 226, 245, 306, 368, 376) reviews of the smoking intervention literature have focused on the need to devote more energy to developing procedures to assure long-term, robust behavior change. The continuing problems of nonreplications and minimal treatment effects have, however, kept most researchers searching for new or more effective *cessation* strategies. Yet past research has clearly indicated that most smokers motivated to quit relapse shortly after treatment termination (170, 171). Thus all interventions should recognize that the production of the initial cessation is only the start of treatment (26, 226, 245, 306). Detailed procedures to aid the recent ex-smoker learn the skills needed to solidify the behavior change should become an integral part of all treatments.

Existing attempts to add maintenance programming to various treatments have proven somewhat ineffective (306). When offered booster sessions or telephone support if problems arise, most participants fail to make use of the services (27, 380). Experimental tests of the booster treatment approach generally have shown equivocal results (84, 202, 325). Paradoxically, supportive phone calls during or after treatment seem to lead to significantly poorer long-term results (28, 84, 380). It has been suggested that maintenance programming must be offered in a fashion that will enhance rather than distract from self-attributions of success (29, 203).

Some initial positive findings are available, however. Dubren (90) reported some success utilizing tape-recorded telephone reinforcement messages during the follow-up of a televised smoking clinic. After some initial negative and inconsistent results (206), Lando (210) demonstrated, but was unable to replicate, that the long-term effectiveness of an aversive smoking program may be enhanced by a broad-spectrum, contingency-contracting program. Seven maintenance sessions over a 2-month period produced abstinence, validated by informant reports, in 76 percent (13 of 17) of the maintenance group subjects at 6-month follow-up, versus only 35 percent (6 of 17) of the controls given cessation treatment only. Case study data support the maintenance-contracting concept (222). Recent dissertation data also appear to provide some encouraging findings regarding maintenance programming (84).

Attempts to add on maintenance procedures have generally been ineffective (27, 31, 202, 206, 292, 356). However, several effective programs appear to have integrated into the total treatment package extended contacts and training in the behavioral skills (28, 44, 45, 58, 210, 308). These factors may be required to maintain abstinence. More

research is needed to define what types of maintenance procedures are needed and when and how they can be most effectively administered (306).

Research has begun to clarify the personal and situational factors which support smoking and which may induce ex-smokers back into the habit (30, 97, 110, 111, 243, 256, 349, 359). Individual difference factors have been overemphasized in the analysis of relapse, however, compared to situational factors (29). Retrospective analyses of individual differences that may be related to successful cessation have generally suggested that older males with lighter smoking habits and from higher social classes tend to be more successful (92, 126, 149, 233, 271, 323, 389, 390), but the magnitude of these differences has been small (29). Several studies have suggested that individuals who report using smoking to control negative affect or who have higher levels of anxiety also appear more susceptible to relapse (89, 105, 179, 180, 292, 370, 375, 389, 390, 399, 400). Efforts to utilize broad individual differences to maximize treatment effectiveness have been mixed and generally inconclusive (27, 32, 33, 53, 205, 212, 292). Given that broad smoking topographies (1, 29, 176, 177, 256, 349) and personality tests (27, 179) lack sufficient specificity, Best and Bloch (29) have suggested that emphasis should be placed on locating interactions between finer variations in the individual's situational cues and smoking patterns (30, 97, 110, 111, 243) and responsiveness to treatment modalities.

McAlister (245, 246) has outlined several other important areas that should be addressed in maintenance programming. Smokers need to be given a positive set regarding withdrawal symptoms and their ability to deal with them. Some data suggest that misattribution-type therapy can be helpful in achieving this goal (16, 245). Since most smokers, especially women, believe they will gain weight if they quit (271), fear of the documented weight gain after cessation (37, 50, 62, 122) should be directly countered (245). The role of negative self-evaluations and common rationalizations (76) also requires further clarification (13, 245). McAlister (245) has suggested that specific plans be formulated to aid ex-smokers confront their predicted problem areas.

Research interest in the important area of maintenance programming is beginning, but many issues remain to be defined and tested. Preliminary data suggest that multicomponent programs are more effective when extended contacts are planned into the program and diverse techniques are individualized to meet the special needs of all participants. Given the concern over smoking among women (65, 162, 214, 335), their special needs should be addressed.

General Overview of Data

Status of Methodology

As stated at the beginning of this section, there have been great improvements in the quality of data on smoking cessation methods in recent years (26, 226, 368, 376), especially in several research clinics (81, 82, 178, 283, 381, 382), large-scale coronary prevention trials (101, 265, 266, 324, 441), and in the behavioral research area (26, 29, 226). Yet the validity of the self-report data remains a critical concern. Since the validity of reported abstinence has been questioned by physiological measures in up to 20 percent of clinic participants (47, 82, 178, 231), it appears that many individuals may be reporting their commitment and expectations of success rather than their current smoking behavior. Ohlin and associates (283) revealed that, of the 19.2 percent (25 of 130) of the reportedly abstinent subjects who had COHb levels above a 0.8 percent nonsmoking cutoff at treatment termination, none was reporting abstinence at 6-month follow-up. With the current state of unverified self-report data, one must interpret cautiously even the commonly cited relapse curves (170, 171).

Random assignment to experimental conditions and the use of one or more control conditions have become much more common, especially in the behavioral research areas. Broad generalizations of the data continue to be made about the general efficacy of procedures with little regard for the interactive effects of age, gender, social class, or smoking topographies of successful participants. The small samples of almost all comparative research relegate these sources of possible interaction to the error variance. This, plus wide variability in the actual application of supposedly identical procedures, makes comparisons across individual studies difficult.

The continuing pattern of nonreplication and the lack of clear superiority of treatments over appropriate controls further suggest the need to balance these advances in research methodology with a practical and clinical sensitivity to the complexity of the problem (7, 43, 224, 225, 304). The guidelines offered by several comprehensive clinics (43, 224, 304, 372, 375, 379, 380, 381, 383, 440) should serve to direct initial clinical testing of procedures. As McAlister (245) has outlined, procedures should first be intensively piloted with single individuals or small groups. The technology for the use of quasi-experimental (56, 393) with other methods should make it possible to conduct multiple case studies with adequate statistical validity (108, 158a, 293, 415). When clinically refined, the treatment techniques can be tested against appropriate controls, especially attention-placebo controls (24, 56, 226, 251, 272). When the format and techniques are well understood and documented, they can be replicated by other researchers in diverse settings (245, 304, 398).

Although behavioral research has been advancing in experimental rigor, less progress has been made in public service and proprietary clinics. Objective and controlled evaluations are still needed in these settings. Though the treatment focus of these clinics makes classical experimental designs unattractive, alternative quasi-experimental designs should be investigated, since the technology exists to provide a degree of control in almost any field or applied setting (56, 393). If such evaluations were undertaken, a wealth of data would be available to guide more controlled research (398).

Most researchers now seem at least aware of the need to conduct long-term follow-ups of all participants. While various professional and financial constraints tend to limit this process, follow-ups of at least 6 months are becoming common. Innovative suggestions, such as obtaining the name of a contact who will know the future whereabouts of the participant, have been offered to aid in tracking participants during follow-up (232). The public service and proprietary clinics are only beginning to recognize their responsibility in this area, and little is known about the long-term efficacy of these programs.

In summary, the research on smoking-modification strategies over the past 15 years clearly indicates that past recommendations regarding adequate methodology still need to be heeded (24, 26, 226, 251, 272, 366, 376). Researchers also need to become more aware of social contingencies such as clinical zeal, publication pressures, and dissertation timetables which have led to poor adherence to these guidelines (225). Data on the reliability and validity of self-reports of smoking behavior now strongly suggest that unverified, global self-reports should no longer be accepted as the only outcome data. Objective techniques for measuring smoking exposure can be developed to validate and supplement self-report data. While great advances in methodology have been made in the past 15 years (26, 226, 376), new technical and design approaches now under study should serve to improve further the quality of the data collected in the future.

Implications of the Data

In light of the amount of research conducted over the past 15 years, it is remarkable that we have so little outcome data on the wide variety of treatments being offered and recommended. Equally astounding is how little we know about the millions of smokers who have quit on their own. As noted in other sections, it has been estimated that 95 percent of the 29 million smokers who have quit since 1964 have done so on their own (270). Various surveys have revealed that the cumulative quit rates for various age groups, social classes, and occupations are impressive (92, 121, 133, 149, 271, 323, 421). The sporadic and marginal quality of outcome data on treatment programs, however, makes it impossible to conclude how this broad social phenomenon has affected clinical and research programs. Survey data

have shown that only a third or less of smokers motivated to quit are interested in formal programs (119, 371), and only a small minority of those who do express an interest actually attend programs when they are offered (195, 270). It thus appears that objective outcome data that are available may be based on a small minority sample of smokers at large.

Objective data are lacking on most of the smokers who have been willing to attend formal programs. Public service clinics continue, but the lack of objective outcome data precludes the evaluation of their efficacy. Similarly, proprietary programs remain virtually unmonitored and unevaluated in an objective fashion. Smoking counseling by medical or health care personnel seems to be highly effective with symptomatic smokers (227, 338), but the efficacy of such an approach for other smokers has yet to be adequately evaluated. The data from the large scale coronary prevention trials (101, 265, 266, 324, 441) should help clarify some issues regarding medical counseling and smoking cessation among higher risk individuals, but the nonspecific treatment focus of these projects will limit the conclusions that can be drawn.

Controlled research has yet to produce a clearly superior intervention strategy. However, the rapidly accumulating and improving research data now suggest that multicomponent interventions offered by intervention teams with practical knowledge regarding the smoking problem are the most encouraging. In part, the added effectiveness of some programs may be due to the skills of the intervention team to present the available techniques as both credible and attractive to the participants (173, 175). It is important to recognize that improved success in recent studies may also be influenced by changes in social norms regarding smoking. More integration of diverse perspectives, including pharmacological, behavioral, medical, and social aspects of the smoking habit, should enhance the multicomponent treatment approach. It is encouraging to note that more research emphasis has begun to be focused on maintenance programming. Apparently the multicomponent programs enable participants to gain the new skills needed to deal with their individual problems in adjusting to the new nonsmoking lifestyle. Many issues remain to be researched, however, and special programs may be required to deal with the needs of smokers with personal or environmental factors that encourage recidivism.

Recommendations for Future Research

Objective Measures of Smoking

An adequate technology to validate self-report smoking data is critically needed. When physiological assessments have been done, inaccuracies in self-reported abstinence are common. Inaccuracies in

rate estimates among the continuing smokers cannot, however, be accurately evaluated with existing technology. If reliable physiological measures of smoking rate were available, the effects of various procedures in producing not only abstinence but meaningful and enduring reductions in smoke exposure could be objectively verified. Basic pharmacological and biological research is needed to formulate such objective measures of smoking.

Maximizing Unaided Cessation

The phenomenon of smoking cessation outside formal programs remains largely unexplored. Almost all successful ex-smokers quit on their own, but little is known about how to maximize this process. Existing survey data suggest that most smokers who are motivated to quit are not interested in attending formal programs. Most smokers report being interested in do-it-yourself quit methods or procedures. Therefore, precise information is needed regarding what types of treatments smokers view as credible, useful, and attractive. Controlled research is needed to evaluate the most cost-effective programs to make attractive and effective programs available to smokers who desire to quit. As treatments are refined in controlled research, they need to be translated into formats which are appropriate for testing with general population groups.

Development of Maintenance Strategies

The research on methods to assure that smokers who successfully quit have the behavioral skills and social supports needed to maintain and solidify the behavior change is currently at a very primitive stage. More basic research is needed to clarify the topography of smoking and relapse behavior so that the specific needs of various types of smokers can be fulfilled. Procedures and programs to aid smokers achieve cessation must be refined; past experience shows that the production of high rates of initial abstinence does not insure a noteworthy level of long-term abstinence. Different classes and types of smokers may require different levels of maintenance assistance. Specific smoking topography variables that predict such needs should be defined. Existing research on maintenance programming indicates that the maintenance procedures should be integrated into the treatment package rather than added on as an option at the end of the treatment. The development of maintenance strategies should be viewed as an integral part of the intervention package and should be evaluated accordingly.

Evaluation of Existing Programs and Procedures

As should be clear from the review of existing data, methodologically sound evaluations of all forms of smoking intervention are still greatly

needed. The increased rigor in the behavioral research area has begun to produce some tentative suggestions regarding effective strategies. However, the more promising multicomponent treatment packages pose new, more complex issues for evaluation. Alternative methods of effectively presenting the most effectual programs to the general public need to be explored and properly evaluated. In addition, the most attractive of the behavioral programs should be experimentally tested relative to other existing intervention strategies in order to produce relative outcome data for evaluation.

The potential efficacy of smoking cessation and reduction counseling by physicians and health care professionals also should be experimentally evaluated. The existing technology derived from behavioral and social psychological research should be integrated into interventions appropriate for use in medical settings.

All public service clinics and proprietary programs should be subjected to rigorous and continuing evaluation. Such programs must recognize their responsibility to the smoking public to present objective evaluations of long-term effectiveness. In addition, proper evaluations should lead to refinements in treatment procedures. As effective treatment strategies are developed and objectively evaluated within research programs, they should be translated into clinic formats for utilization and evaluation within the general population.

Modification of Smoking Behavior: References

- (1) ADESSO, V.J., GLAD, W.R. A behavioral test of a smoking typology. *Addictive Behaviors* 3: 35-38, 1978.
- (2) AMERICAN CANCER SOCIETY. *Stop Smoking Program Guide*. San Francisco, American Cancer Society, California Division, 1971, 178 pp.
- (3) AMERICAN CANCER SOCIETY. Task Force on Tobacco and Cancer—Target 5. Report to the Board of Directors. American Cancer Society, Inc., 1976, 82 pp.
- (4) ANDER, S. Who gives up smoking after a myocardial infarction? In: Richardson, R.G. (Editor). *The Second World Conference on Smoking and Health*. London, Pitman Medical, 1971, pp. 175-178.
- (5) AUGER, T.J., WRIGHT, E., JR., SIMPSON, R.H. Posters as smoking deterrents. *Journal of Applied Psychology* 56(2): 169-171, April 1972.
- (6) AXELROD, S., HALL, R.V., WEIS, L., ROHRER, S. Use of self-imposed contingencies to reduce the frequency of smoking behavior. In: Mahoney, M.J., Thoresen, C.E. (Editors). *Self-Control: Power to the Person*. Monterey, Brooks/Cole Publishing Company, 1974, pp. 77-85.
- (7) AZRIN, N.H. A strategy for applied research. Learning based but outcome oriented. *American Psychologist* 32(2): 140-149, February 1977.
- (8) AZRIN, N.H., POWELL, J. Behavioral engineering: The reduction of smoking behavior by a conditioning apparatus and procedure. *Journal of Applied Behavior Analysis* 1(3): 193-200, Fall 1968.
- (9) BAER, P.E., FOREYT, J.P., WRIGHT, S. Self-directed termination of excessive cigarette use among untreated smokers. *Journal of Behavior Therapy and Experimental Psychiatry* 8(1): 71-74, March 1977.
- (10) BAKEWELL, H.A. The relevance of goal-setting in a smoking reduction program. Doctoral dissertation, University of Utah, 1972, 119 pp. *Dissertation Abstracts International* 33(3): 1280-B, September 1972. (University Microfilms No. 72-24,574).
- (11) BALL, K.H. Cigarettes and the prevention of heart disease. *Rehabilitation* 25(1-2): 17-20, 1972.
- (12) BANDURA, A. *Principles of Behavior Modification*. New York, Holt, Rinehart and Winston, Inc., 1969, 677 pp.
- (13) BANDURA, A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review* 84(2): 191-215, 1977.
- (14) BANDURA, A. *Social Learning Theory*. Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 1977, 203 pp.
- (15) BARBARIN, O.A. III. A Comparison of Overt and Symbolic Aversion in the Self-Management of Chronic Smoking Behavior. Doctoral dissertation, Rutgers University, State University of New Jersey, 1975, 128 pp. *Dissertation Abstracts International* 36(5): 2457-B-2458-B, November 1975. (University Microfilms No. 75-24,655).
- (16) BAREFOOT, J.C., GIRODO, M. The misattribution of smoking cessation symptoms. *Canadian Journal of Behavioral Science* 4(4): 358-363, 1972.
- (17) BARIC, L., MACARTHUR, C., SHERWOOD, M. A study of health education aspects of smoking in pregnancy. *International Journal of Health Education, Supplement to Volume* 19(2): 1-17, April-June 1976.
- (18) BARKLEY, R.A., HASTINGS, J.E., JACKSON, T.L., JR. The effects of rapid smoking and hypnosis in the treatment of smoking behavior. *International Journal of Clinical and Experimental Hypnosis* 25(1): 7-17, January 1977.
- (19) BARYLKO-PIKIELNA, N., PANGBORN, R.M. Effect of cigarette smoking on urinary and salivary thiocyanates. *Archives of Environmental Health* 17(5): 739-745, November 1968.

- (20) BEAVERS, M.E. Smoking Control: A Comparison of Three Aversive Conditioning Treatments. Doctoral dissertation, University of Arizona, 1973, 64 pp. Dissertation Abstracts International 34(6): 2919-B-2920-B, December 1973. (University Microfilms No. 73-28,782).
- (21) BEREZ, J.M. Reduction of cigarette smoking through self-administered aversion conditioning: A new treatment model with implications for public health. *Social Science and Medicine* 6(1): 57-66, February 1972.
- (22) BEREZ, J. Treatment of smoking with cognitive conditioning therapy: A self-administered aversion technique. *Behavior Therapy* 7(5): 641-648, October 1976.
- (23) BERNARD, H.S., EFRAN, J.S. Case histories and shorter communications. Eliminating versus reducing smoking using pocket timers. *Behavior Research and Therapy* 10(4): 399-401, November 1972.
- (24) BERNSTEIN, D.A. Modification of smoking behavior: An evaluative review. *Psychological Bulletin* 71(6): 418-440, 1969.
- (25) BERNSTEIN, D.A. The modification of smoking behavior: A search for effective variables. *Behavior Research and Therapy* 8(2): 133-146, June 1970.
- (26) BERNSTEIN, D.A., McALISTER, A. The modification of smoking behavior: Progress and problems. *Addictive Behaviors* 1(2): 89-102, 1976.
- (27) BEST, J.A. Tailoring smoking withdrawal procedures to personality and motivational differences. *Journal of Consulting and Clinical Psychology* 43(1): 1-8, February 1975.
- (28) BEST, J.A., BASS, F., OWEN, L.E. Mode of service delivery in a smoking cessation programme for public health. *Canadian Journal of Public Health* 68: 469-473, 1977.
- (29) BEST, J.A., BLOCH, M. On improving compliance: Cigarette smoking. In: Haynes, R.B., Sackett, D.L. (Editors). *Compliance*. Baltimore, Johns Hopkins University Press, 65 pp. (to be published).
- (30) BEST, J.A., HAKSTIAN, A.R. A situation-specific model for smoking behavior. *Addictive Behaviors*, 3(2): 79-92, 1978.
- (31) BEST, J.A., OWEN, L.E., TRENTADUE, L. Comparison of satiation and rapid smoking in self-managed smoking cessation. *Addictive Behaviors*, 3(2): 71-78, 1978.
- (32) BEST, J.A., STEFFY, R.A. Smoking modification procedures for internal and external locus of control clients. *Canadian Journal of Behavioral Science/Revue Canadienne de Science du Comportement* 7(2): 155-165, April 1975.
- (33) BEST, J.A., STEFFY, R.A. Smoking modification procedures tailored to subject characteristics. *Behavior Therapy* 2(2): 177-191, April 1971.
- (34) BIBIN, L.J. An Investigation of the Effectiveness of Covert Role Playing Using a Suggestion Oriented Relaxation Technique to Assist Smokers to Stop Smoking. Doctoral dissertation, United States International University, 1975, 229 pp. Dissertation Abstracts International 36(4): 1900-B, October 1975. (University Microfilms No. 75-22,652).
- (35) BIRNBAUM, A.P. Smokers Differential Response to an Enriched Treatment Procedure as a Function of Motivation for Smoking. Doctoral dissertation, Southern Illinois University, 1975, 156 pp. Dissertation Abstracts International 36(12): 6350-B, June 1976. (University Microfilms No. 76-13,221).
- (36) BLACKBURN, H. Progress in the epidemiology and prevention of coronary heart disease. In: Yu, P.N., Goodwin, J.F. (Editors). *Progress in Cardiology*, Volume 3. Philadelphia, Lea & Febiger, 1974, pp. 1-36.
- (37) BLITZER, P.H., RIMM, A.A., GIEFER, E.E. The effect of cessation of smoking on body weight in 57,032 women: Cross-sectional and longitudinal analyses. *Journal of Chronic Diseases* 30(1): 415-429, July 1977.

- (38) BOVILSKY, D.M. A Comparison of Confrontational and Non-Directive Group Experiences in Influencing Smoking Behavior. Doctoral dissertation, Columbia University, 1972, 154 pp. Dissertation Abstracts International 36(5): 2459-B-2460-B, November 1975. (University Microfilms No. 75-25,652).
- (39) BOZZETTI, L.P. Group psychotherapy with addicted smokers. *Psychotherapy and Psychosomatics* 20(3/4): 172-175, 1972.
- (40) BRADSHAW, P.W. The problem of cigarette smoking and its control. *International Journal of the Addictions* 8(2): 353-371, 1973.
- (41) BRANTMARK, B., OHLIN, P., WESTLING, H. Nicotine-containing chewing gum as an anti-smoking aid. *Psychopharmacologia* 31(3): 191-200, 1973.
- (42) BRENGELMANN, J.C. *Manual on Smoking Cessation Therapy. Facts and Suggestions for the Treatment of Smoking.* Geneva, International Journal of Health Education, 1975, 71 pp.
- (43) BRENGELMANN, J.C. The organization of treatment for the cessation of smoking. In: Steinfeld, J., Griffiths, W., Ball, K., Taylor, R.M. (Editors). *Proceedings of the Third World Conference on Smoking and Health*, New York, June 2-5, 1975. Volume II. Health Consequences, Education, Cessation Activities, and Social Action. U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, DHEW Publication No. (NIH) 77-1413, 1977, pp. 655-663.
- (44) BRENGELMANN, J.C., SEDLMAYR, E. Experimente zur behandlung des rauchens (Experiments for the treatment of smoking). *Schriftenreihe des Bundesministers fuer Jugend, Familie und Gesundheit*, Band 35. Stuttgart, Verlag W. Kohlhammer, 1976, 165 pp.
- (45) BRENGELMANN, J.C., SEDLMAYR, E. Experiments in the reduction of smoking behavior. In: Steinfeld, J., Griffiths, W., Ball, K., Taylor, R.M. (Editors). *Proceedings of the Third World Conference on Smoking and Health*, New York, June 2-5, 1975. Volume II. Health Consequences, Education, Cessation Activities, and Social Action. U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, DHEW Publication No. (NIH) 77-1413, 1977, pp. 533-543.
- (46) BRITISH MEDICAL JOURNAL. Do people smoke for nicotine? *British Medical Journal* 2(6094): 1041-1042, October 22, 1977. (Editorial)
- (47) BROCKWAY, B.S. Chemical validation of self-reported smoking rates. *Behavior Therapy*, 6 pp. (to be published).
- (48) BROCKWAY, B.S., KLEINMANN, G., EDLESON, J., GRUENEWALD, K. Non-aversive procedures and their effect on cigarette smoking. *Addictive Behaviors* 2(2): 121-128, 1977.
- (49) BROSS, I.D.J. Less harmful ways of smoking. In: Wynder, E.L., Hoffmann, D., Gori, G.B. (Editors). *Proceedings of the Third World Conference on Smoking and Health*, New York, June 2-5, 1975. Volume I. Modifying the Risk for the Smoker. U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, Publication No. (NIH) 76-1221, 1976, pp. 111-118.
- (50) BROZEK, J., KEYS, A. Changes of body weight in normal men who stop smoking cigarettes. *Science* 125(3259): 1203, June 14, 1957.
- (51) BURNS, B.H. Chronic chest disease, personality, and success in stopping cigarette smoking. *British Journal of Preventive and Social Medicine* 23(1): 23-27, February 1969.
- (52) BURT, A., THORNLEY, P., ILLINGWORTH, D., WHITE, P., SHAW, T.R.D., TURNER, R. Stopping smoking after myocardial infarction. *Lancet* 1(7852): 304-306, February 23, 1974.
- (53) BURTON, D. Consistency versus internality as initiators of behavior change. *International Journal of the Addictions* 12(4): 553-563, 1977.

- (54) BUTTS, W.C., KUEHNEMAN, M., WIDDOWSON, G.M. Automated method for determining serum thiocyanate, to distinguish smokers from nonsmokers. *Clinical Chemistry* 20(10): 1344-1348, 1974.
- (55) CALIFORNIA MEDICAL ASSOCIATION. The Smoking Study. A report of the attitudes and habits of California physicians with respect to cigarette smoking. *California Medicine* 109(4): 339-344, October 1968.
- (56) CAMPBELL, D.T., STANLEY, J.C. *Experimental and Quasi-Experimental Designs for Research*. Chicago, Rand McNally & Company, 1966, 84 pp.
- (57) CAUTELA, J.R. Treatment of smoking by covert sensitization. *Psychological Reports* 26(2): 415-420, 1970.
- (58) CHAPMAN, R.F., SMITH, J.W., LAYDEN, T.A. Elimination of cigarette smoking by punishment and self-management training. *Behavior Research and Therapy* 9(3): 255-264, 1971.
- (59) CLAIBORN, W.L., LEWIS, P., HUMBLE, S. Stimulus satiation and smoking: A revisit. *Journal of Clinical Psychology* 28(7): 416-419, 1972.
- (60) COCHRAN, N.N. A Methodological Analysis of Two Self-Control Procedures: Self-Monitoring and Thought-Stopping Applied to Smoking Behavior. Doctoral dissertation, University of Mississippi, 1976, 137 pp. *Dissertation Abstracts International* 37(1): 5826-B-5827B, May 1977. (University Microfilms No. 77-11,181).
- (61) COHEN, S.I., PERKINS, N.M., URY, H.K., GOLDSMITH, J.R. Carbon monoxide uptake in cigarette smoking. *Archives of Environmental Health* 22(1): 55-60, January 1971.
- (62) COMSTOCK, G.W., STONE, R.W. Changes in body weight and subcutaneous fatness related to smoking habits. *Archives of Environmental Health* 24(4): 271-276, April 1972.
- (63) CONRAD, F.G. Smoking-withdrawal clinics. *New England Journal of Medicine* 285(1): 60, July 1, 1971.
- (64) CONWAY, J.B. Behavioral self-control of smoking through aversive conditioning and self-management. *Journal of Consulting and Clinical Psychology* 45(3): 348-357, June 1977.
- (65) CORTINES, C. Chronic disease and other aspects of women's smoking in the United States. In: Steinfeld, J., Griffiths, W., Ball, K., Taylor, R.M. (Editors). *Proceedings of the Third World Conference on Smoking and Health*, New York, June 2-5, 1975. Volume II. Health Consequences, Education, Cessation Activities, and Social Action. U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, DHEW Publication No. (NIH) 77-1413, 1977, pp. 293-297.
- (66) CRASILNECK, H.B., HALL, J.A. Clinical hypnosis: Application in smoking and obesity problems. *Dallas Medical Journal* 62(6): 296-302, June 1976.
- (67) CRASILNECK, H.B., Hall, J.A. Hypnosis in the control of smoking. In: *Clinical Hypnosis: Principles and Applications*. New York, Grune and Stratton, 1975, pp. 167-175.
- (68) CROOG, S.H., RICHARDS, N.P. Health beliefs and smoking patterns in heart patients and their wives: A longitudinal study. *American Journal of Public Health* 67(10): 921-930, October 1977.
- (69) CUDAHY, H.H. A Comparison of Two Operant Methods in the Treatment of Smoking. Doctoral dissertation, University of Utah, 1975, 127 pp. *Dissertation Abstracts International* 36(6): 3029-B, December 1975. (University Microfilms No. 75-28,866).
- (70) CURTIS, B., SIMPSON, D.D., COLE, S.G. Rapid puffing as a treatment component of a community smoking program. *Journal of Community Psychology* 4(2): 186-193, April 1976.

- (71) DANAHER, B.G. Rapid smoking and self-control in the modification of smoking behavior. *Journal of Consulting and Clinical Psychology* 45(6): 1068-1075, December 1977.
- (72) DANAHER, B.G. Research on rapid smoking: Interim summary and recommendations. *Addictive Behaviors* 2(2): 151-166, 1977.
- (72a) DANAHER, B.G., LICHTENSTEIN, E. Become an ex-smoker. Englewood Cliffs, N.J., Prentice Hall, 1978, 226 pp.
- (73) DANAHER, B.G., LICHTENSTEIN, E., SULLIVAN, J.M. Comparative effects of rapid and normal smoking on heart rate and carboxyhemoglobin. *Journal of Consulting and Clinical Psychology* 44(4): 556-563, August 1976.
- (74) DANAHER, B.G., SHISLAK, C.M., THOMPSON, C.B., FORD, J.D. A smoking cessation program for pregnant women: An exploratory study. *American Journal of Public Health*, 68(9): 896-898, 1978.
- (75) DASTUR, D.K., QUADROS, E.V., WADIA, N.H., DESAI, M.M., BHARUCHA, E.P. Effect of vegetarianism and smoking on Vitamin B₁₂, thiocyanate, and folate levels in the blood of normal subjects. *British Medical Journal* 3(5821): 260-263, July 29, 1972.
- (76) DAVIDSON, H.A. Rationalizations for continued smoking. *New York State Journal of Medicine* 64: 2993-3001, December 15, 1964.
- (77) DAVISON, G.C., ROSEN, R.C. Lobeline and reduction of cigarette smoking. *Psychological Reports* 31(2): 443-456, October 1972.
- (78) DAWLEY, H.H. Jr., DILLENKOFFER, R.L. Letter to the Editor. Minimizing the risks in rapid smoking treatment. *Journal of Behavior Therapy and Experimental Psychiatry* 6(2): 174, August 1975.
- (79) DAWLEY, H.H. JR., ELLITHORPE, D.B., TRETOLA, R. Aversive smoking: Carboxyhemoglobin levels before and after rapid smoking. *Journal of Behavior Therapy and Experimental Psychiatry* 7(1): 13-15, March 1976.
- (80) DELAHUNT, J., CURRAN, J.P. Effectiveness of negative practice and self-control techniques in the reduction of smoking behavior. *Journal of Consulting and Clinical Psychology* 44(6): 1002-1007, December 1976.
- (81) DELARUE, N.C. The anti-smoking clinic: Is it a potential community service? *Canadian Medical Association Journal* 108(9): 1164-65, 1168, 1171-1172, 1192, May 5, 1973.
- (82) DELARUE, N.C. A study in smoking withdrawal. The Toronto smoking withdrawal study centre—description of activities. *Canadian Journal of Public Health, Smoking and Health Supplement* 64(2): S5-S19, March/April 1973.
- (83) DENSEN, P.M., DAVIDOW, B., BASS, H.E., JONES, E.W. A chemical test for smoking exposure. *Archives of Environmental Health* 14(6): 865-874, June 1967.
- (84) DERDEN, R.H., JR. The Effectiveness of Follow-up Strategies in Smoking Cessation. Doctoral dissertation, University of Pittsburgh, 1977, 204 pp. *Dissertation Abstracts International* 38(5): 2359-B-2360-B, November 1977. (University Microfilms No. 77-23,582).
- (85) DERICCO, D.A., BRIGHAM, T.A., GARLINGTON, W.K. Development and evaluation of treatment paradigms for the suppression of smoking behavior. *Journal of Applied Behavior Analysis* 10(2): 173-181, Summer 1977.
- (86) DICKEN, C., BRYSON, R. Psychology in action. The smoking of psychology. *American Psychologist* 33(5): 504-507, May 1978.
- (87) DICKSON, C.R. The Effects of Self-Monitoring on Smoking Rate. Doctoral dissertation, University of Nevada, Reno, 1971, 102 pp. *Dissertation Abstracts International* 32(5): 5436-B, March 1972. (University Microfilms No. 72-9565).

- (88) DITTRICH, R.A. An Investigation of Therapeutic Instructions, Progress Feedback, and Patient Expectation in Relation to Treatment Outcome. Doctoral dissertation, University of Oregon, 1975, 50 pp. Dissertation Abstracts International 36(7): 3597-B-3598-B, January 1976. (University Microfilms No. 76-922).
- (89) DUBITZKY, M., SCHWARTZ, J.L. Ego-resiliency, ego-control, and smoking cessation. *Journal of Psychology* 70: 27-33, September 1968.
- (90) DUBREN, R. Evaluation of a televised stop-smoking clinic. *Public Health Reports* 92(1): 81-84, January/February 1977.
- (91) DUBREN, R. Self-reinforcement by recorded telephone messages to maintain nonsmoking behavior. *Journal of Consulting and Clinical Psychology* 45(3): 358-360, June 1977.
- (92) EISINGER, R.A. Psychosocial predictors of smoking recidivism. *Journal of Health and Social Behavior* 12: 355-362, December 1971.
- (93) EJRP, B. A proposed medical regimen to stop smoking. The follow-up results. Swedish Cancer Society. Yearbook 3: 468-473, 1963-65.
- (94) ELLIOTT, C.H. A Multiple Component Treatment Approach to Smoking Reduction. Doctoral dissertation, University of Kansas, 1976, 122 pp. Dissertation Abstracts International 38(2): 893-B-894-B, August 1977. (University Microfilms No. 77-16,272).
- (95) ELLIOTT, R., TIGHE, T. Breaking the cigarette habit: Effects of a technique involving threatened loss of money. *Psychological Record* 18: 503-513, 1968.
- (96) ENGELN, R.G. A Comparison of Desensitization and Aversive Conditioning as Treatment Methods to Reduce Cigarette Smoking. Doctoral dissertation, Washington State University, 1969, 86 pp. Dissertation Abstracts International 30(2): 1357-B, September 1969. (University Microfilms No. 69-14,447).
- (97) EPSTEIN, L.H., COLLINS, F.L., JR. The measurement of situational influences of smoking. *Addictive Behaviors* 2(1): 47-53, 1977.
- (98) EVANS, M.W. The Avdel smoking project. *Health Education Journal* 32(3): 76-81, 1973.
- (99) EVANS, R.I., HANSEN, W.B., MITTELMARK, M.B. Increasing the validity of self-reports of smoking behavior in children. *Journal of Applied Psychology* 62(4): 521-523, 1977.
- (100) EYRES, S.J. Public health nursing section report of the 1972 APHA smoking survey. *American Journal of Public Health* 63(10): 846-852, October 1973.
- (101) FARQUHAR, J.W., MACCOBY, N., WOOD, P.D., ALEXANDER, J.K., BREITROSE, H., BROWN, B.W., JR., HASKELL, W.L., McALISTER, A.L., MEYER, A.J., NASH, J.D., STERN, M.P. Community education for cardiovascular health. *Lancet* 1(8023): 1192-1195, June 4, 1977.
- (102) FERNO, O. The development of a chewing gum containing nicotine and some comments on the role played by nicotine in the smoking habit. In: Steinfeld, J., Griffiths, W., Ball, K., Taylor, R.M. (Editors). *Proceedings of the Third World Conference on Smoking and Health*, New York, June 2-5, 1975. Volume II. Health Consequences, Education, Cessation Activities, and Social Action. U.S. Department of Health, Education and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, DHEW Publication No. (NIH) 77-1413, 1977, pp. 569-573.
- (103) FERNO, O., LICHTNECKERT, S.J.A., LUNDGREN, C.E.G. A substitute for tobacco smoking. *Psychopharmacologia* 31(3): 201-204, 1973.
- (104) FLAXMAN, J. Quitting smoking now or later: Gradual, abrupt, immediate, and delayed quitting. *Behavior Therapy* 9(2): 260-270, March 1978.
- (105) FRANCISCO, J.W. Modification of Smoking Behavior: A Comparison of Three Approaches. Doctoral dissertation, Wayne State University, 1972, 87 pp. Dissertation Abstracts International 33(11): 5511-B-5512-B, May 1973. (University Microfilms No. 73-12,511).

- (106) FRANKS, C.M. Behavior Therapy Appraisal and Status. New York, McGraw-Hill Book Company, 1969, 780 pp.
- (107) FRANKS, C.M., FRIED, R., ASHEM, B. An improved apparatus for the aversive conditioning of cigarette smokers. *Behavior Research and Therapy* 4(4): 301-308, November 1966.
- (108) FREDERIKSEN, L.W. Single-case designs in the modification of smoking. *Addictive Behaviors* 1(4): 311-319, 1976.
- (109) FREDERIKSEN, L.W., EPSTEIN, L.H., KOSEVSKY, B.P. Reliability and controlling effects of three procedures for self-monitoring smoking. *Psychological Record* 25(2): 255-264, 1975.
- (110) FREDERIKSEN, L.W., FRAZIER, M. Temporal distribution of smoking. *Addictive Behaviors*. 2(3): 187-192, 1977.
- (111) FREDERIKSEN, L.W., MILLER, P.M., PETERSON, G.L. Topographical components of smoking behavior. *Addictive Behaviors*. 2(1): 55-61, 1977.
- (112) FREDERIKSEN, L.W., PETERSON, G.L., MURPHY, W.D. Controlled smoking: Development and maintenance. *Addictive Behaviors* 1(3): 193-196, 1976.
- (113) FREDRICKSON, D.T. Cigarette smoking: Questions patients ask doctors (Part I and II) *Chest* 58(2 and 4): 147-151, 369-372, August and October 1970.
- (114) FREDRICKSON, D.T. The community's response to substance misuse. *New York City Smoking Withdrawal Clinic. International Journal of the Addictions* 3(1): 81-89, Spring 1968.
- (115) FREDRICKSON, D.T. How to help your patient stop smoking—Guidelines for the office physician. *Diseases of the Chest* 54(3): 196-202, September 1968.
- (116) FREDRICKSON, D.T., MCALISTER, A., DANAHER, B.G. Giving up smoking: How the various programs work. *Medical World News* 17(24): 52-57, November 1, 1976.
- (117) FRITZ, R. Erfahrungen mit dem "Fuenf-Tage-Plan zur Raucherentwohnung" (Experiences with the "five-day plan to quit smoking"). *Zeitschrift fuer Allgemeinmedizin* 50(13): 628-630, May 10, 1974.
- (118) FUHRER, R.E. The Effects of Covert Sensitization with Relaxation Induction, Covert Sensitization Without Relaxation Induction, and Attention-Placebo on the Reduction of Cigarette Smoking. Doctoral dissertation, University of Montana, 1971, 133 pp. *Dissertation Abstracts International* 32(11): 6644-B-6645-B, May 1972. (University Microfilms No. 72-13,449).
- (119) GALLUP OPINION INDEX. Public puffs on after ten years of warnings. *Gallup Opinion Index (Report No. 108)*: 20-21, June 1974.
- (120) GARDNER, R.M. A Test of Covert Control Therapy to Reduce Cigarette Smoking: A Comparative Study of the Effectiveness of Two Different Strategies with a Direct Test of the Effectiveness of Contingency Management. Doctoral dissertation, University of Louisville, 1970, 95 pp. *Dissertation Abstracts International* 32(05): 3001-B, September 1971. (University Microfilms No. 71-29,132).
- (121) GARFINKEL, L. Cigarette smoking among physicians and other health professionals, 1959-1972. *CA—A Cancer Journal for Clinicians* 26(6): 373-375, November/December 1976.
- (122) GARVEY, A.J., BOSSE, R., SELTZER, C.C. Smoking, weight change, and age. A longitudinal analysis. *Archives of Environmental Health* 28(6): 327-329, June 1974.
- (123) GLASGOW, R.E. Effects of a Self-Control Manual, Rapid Smoking, and Amount of Therapist Contact on Smoking Reduction. Doctoral dissertation, University of Oregon, 1977, 137 pp. *Dissertation Abstracts International* 38(10): 5014-B, April 1978. (University Microfilms No. 7802521).
- (124) GLASGOW, R.E., ROSEN, G.M. Behavioral bibliotherapy: A review of self-help behavior therapy manuals. *Psychological Bulletin* 85(1): 1-23, January 1978.

- (125) GORDON, S.B. Self-Control with a Covert Aversive Stimulus: Modification of Smoking. Doctoral dissertation, West Virginia University, 1971, 73 pp. Dissertation Abstracts International 32(8): 4858-B-4859-B, February 1972. (University Microfilms No. 72-5154).
- (126) GORDON, T., KANNEL, W.B., DAWBER, T.R., MCGEE, D. Changes associated with quitting cigarette smoking: The Framingham Study. *American Heart Journal* 90(3): 322-328, September 1975.
- (127) GORDON, W.M. The Effects of Instructions to Abstain, Rapid Smoking, and Individually Tailored Treatment on Chronic Smoking Behavior. Doctoral dissertation, Rutgers University, State University of New Jersey, 1976, 48 pp. University Microfilms, Inc., Ann Arbor, Michigan, July 1976. (University Microfilms No. 76-16,402).
- (128) GRAHAM, S., GIBSON, R.W. Cessation of patterned behavior: Withdrawal from smoking. *Social Science and Medicine* 5(4): 319-337, August 1971.
- (129) GREEN, L.W. Diffusion and adoption of innovations related to cardiovascular risk behavior in the public. In: Enelow, A.J., Henderson, J.B. (Editors). *Applying Behavioral Science to Cardiovascular Risk. Proceedings of a Conference.* American Heart Association, Inc., 1975, pp. 84-108.
- (130) GREEN, P. The mass media anti-smoking campaign around the world. In: Steinfeld, J., Griffiths, W., Ball, K., Taylor, R.M. (Editors). *Proceedings of the Third World Conference on Smoking and Health, New York, June 2-5, 1975. Volume II. Health Consequences, Education, Cessation Activities, and Social Action.* U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, DHEW Publication No. (NIH) 77-1413, 1977, pp. 245-253.
- (131) GREENBERG, I., ALTMAN, J.L. Modifying smoking behavior through stimulus control: A case study. *Journal of Behavior Therapy and Experimental Psychiatry* 7(1): 97-99, March 1976.
- (132) GREENE, R.J. Modification of smoking behavior by free operant conditioning methods. *Psychological Record* 14(2): 171-178, April 1964.
- (133) GREENE, S.B., AAVEDAL, M.J., TYROLER, H.A., DAVIS, C.E., HAMES, C.G. Smoking habits and blood pressure change: A seven year follow-up. *Journal of Chronic Diseases* 30(1): 401-413, July 1977.
- (134) GREENSPUN, I.F. Modification of Smoking Behavior Through Commitment Enhancement. Doctoral dissertation, State University of New York at Stony Brook, 1974, 158 pp. Dissertation Abstracts International 35(9): 4650-B, March 1975. (University Microfilms No. 75-4571).
- (135) GRIMALDI, K.E., LICHTENSTEIN, E. Hot, smoky air as an aversive stimulus in the treatment of smoking. *Behavior Research and Therapy* 7(3): 275-282, September 1969.
- (136) GRITZ, E.R., JARVIK, M.E. Pharmacological aids for the cessation of smoking. In: Steinfeld, J., Griffiths, W., Ball, K., Taylor, R.M. (Editors). *Proceedings of the Third World Conference on Smoking and Health, New York, June 2-5, 1975. Volume II. Health Consequences, Education, Cessation Activities, and Social Action.* U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, DHEW Publication No. (NIH) 77-1413, 1977, pp. 575-591.
- (137) GUILFORD, J.S. Group treatment versus individual initiative in the cessation of smoking. *Journal of Applied Psychology* 56(2): 162-167, April 1972.
- (138) GUILFORD, J.S. Sex differences between successful and unsuccessful abstainers from smoking. In: Zagona, S.V. *Studies and Issues in Smoking Behavior.* Tucson, University of Arizona Press, 1967, pp. 95-102.
- (139) GUTMANN, M., MARSTON, A. Problems of S's motivation in a behavioral program for reduction of cigarette smoking. *Psychological Reports* 20(4): 1107-1114, June 1967.

- (140) HACKETT, G., HORAN, J.J. Behavioral control of cigarette smoking: A comprehensive program. *Journal of Drug Education* 7(1): 71-79, 1977.
- (141) HACKETT, G., HORAN, J.J. Focused smoking: An unequivocally safe alternative to rapid smoking. *Journal of Drug Education* 8(3): 261-265, 1978.
- (142) HACKETT, G., HORAN, J.J., STONE, C.I., LINBERG, S.E., NICHOLAS, W.C., LUKASKI, H.C. Further outcomes and tentative predictor variables from an evolving comprehensive program for the behavioral control of smoking. *Journal of Drug Education* 7(3): 225-229, 1977-78.
- (143) HALL, J.A., CRASILNECK, H.B. Development of a hypnotic technique for treating chronic cigarette smoking. *International Journal of Clinical and Experimental Hypnosis* 18(4): 283-289, October 1970.
- (144) HALL, R.G., SACHS, D.P.L., HALL, S.M. Medical risk and therapeutic effectiveness of rapid smoking. *Behavior Therapy*, 28 pp. (to be published)
- (145) HALLAQ, J.H. The pledge as an instrument of behavioral change. *Journal of Social Psychology* 98: 147-148, February 1976.
- (146) HAMMEN, C.L. Factors which Affect Self-Controlling Responses in Smoking Cessation. Doctoral dissertation, University of Wisconsin, 1971, 123 pp. Dissertation Abstracts International 32(6): 3636-B, December 1971. (University Microfilms No. 71-23,304).
- (147) HAMMER, O. 5 Jahre Bad Nauheimer Raucher-Entwöhnungstherapie und Nichtraucher-Training. (Five years of the Bad Nauheim nicotine withdrawal therapy and nonsmoker's training). *Muenchener Medizinische Wochenschrift* 116(11): 565-568, March 15, 1974.
- (148) HAMMER, O., ADOLPH, E., HAMMER, R. Gruppentherapie "Frei von Rauchen." Zweijährige Erfahrungen mit dem Bad Nauheimer 5-Tage-Plan. (Group therapy "Free of Smoking". Two years' experience with the Bad Nauheimer 5-day-plan). *Muenchener Medizinische Wochenschrift* 112(28): 1329-1335, July 10, 1970.
- (149) HAMMOND, E.C., GARFINKEL, L. Changes in cigarette smoking. *Journal of The National Cancer Institute* 33(1): 49-64, July 1964.
- (150) HAMMOND, E.C., GARFINKEL, L. The influence of health on smoking habits. Study of Cancer and Other Chronic Diseases. *National Cancer Institute Monograph* 19: 269-285, 1966.
- (151) HAMMOND, E.C., GARFINKEL, L., SEIDMAN, H., LEW, E.A. "Tar" and nicotine content of cigarette smoke in relation to death rates. *Environmental Research* 12(3): 263-274, December 1976.
- (152) HAMMOND, E.C., PERCY, C. Ex-smokers. *New York State Journal of Medicine* 58: 2956-2959, September 15, 1958.
- (153) HANDEL, S. Change in smoking habits in a general practice. *Postgraduate Medical Journal* 49: 679-681, October 1973.
- (154) HARLIN, V.K. The influence of obvious anonymity on the response of school children to a questionnaire about smoking. *American Journal of Public Health* 62(4): 566-574, April 1972.
- (155) HARRIS, M.B., ROTHBERG, C. A self-control approach to reducing smoking. *Psychological Reports* 31(1): 165-166, August 1972.
- (156) HAUSER, R. Rapid smoking as a technique of behavior modification: Caution in selection of subjects. *Journal of Consulting and Clinical Psychology* 42(4): 625, August 1974.
- (157) HAY, D.R., TURBOTT, S. Changes in smoking habits in men under 65 years after myocardial infarction and coronary insufficiency. *British Heart Journal* 32: 738-740, 1970.
- (158) HEPPER, N.G.G., CARR, D.T., ANDERSEN, H.A., FONTANA, R.S., ROSENOW, E.C., III, HANSON, C. Antismoking clinic: Report of an experience and comparison with published results. *Mayo Clinic Proceedings* 45(3): 189-196, March 1970.

- (158a) HERSEN, M., BARLOW, D.E. Single Case Experimental Designs: Strategies for Studying Behavior Changes. New York, Pergamon Press, 1976, 374 pp.
- (159) HIGBEE, K.L. Fifteen years of fear arousal: Research on threat appeals: 1953-1968. *Psychological Bulletin* 72(6): 426-444, December 1969.
- (160) HILDEBRAND, G.I. Improving the adult community through hospital based smoking education and cessation programs. In: Steinfeld, J., Griffiths, W., Ball, K., Taylor, R.M. (Editors). *Proceedings of the Third World Conference on Smoking and Health*, New York, June 2-5, 1975. Volume II. Health Consequences, Education, Cessation Activities, and Social Action. U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, DHEW Publication No. (NIH) 77-1413, 1977, pp. 283-288.
- (161) HILDEBRANDT, D.E. The Impact of Commitment and Technique Training on Smoking. Doctoral dissertation, Northern Illinois University, 1975, 256 pp. *Dissertation Abstracts International* 36(4): 1919-B, October 1975. (University Microfilms No. 75-23,120).
- (162) HILL, H. Situational analysis: Women and smoking. In: Steinfeld, J., Griffiths, W., Ball, K., Taylor, R.M. (Editors). *Proceedings of the Third World Conference on Smoking and Health*, New York, June 2-5, 1975. Volume II. Health Consequences, Education, Cessation Activities, and Social Action. U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, DHEW Publication No. (NIH) 77-1413, 1977, pp. 291-292.
- (163) HOMME, L.E. Perspectives in psychology: XXIV. Control of coverants, the operants of the mind. *Psychological Record* 15(4): 501-511, October 1965.
- (164) HORAN, J.J., HACKETT, G., NICHOLAS, W.C., LINBERG, S.E., STONE, C.L., LUKASKI, H.C. Rapid smoking: A cautionary note. *Journal of Consulting and Clinical Psychology* 45(3): 341-343, June 1977.
- (165) HORAN, J.J., LINBERG, S.E., HACKETT, G. Nicotine poisoning and rapid smoking. *Journal of Consulting and Clinical Psychology* 45(3): 344-347, June 1977.
- (166) HORN, D. An approach to office management of the cigarette smoker. *Diseases of the Chest* 54(3): 203-209, September 1968.
- (167) HORN, D. Epidemiology and psychology of cigarette smoking. *Chest* 59 (5, supplement): 22S-24S, May 1971.
- (168) HUNT, W.A. (Editor). *Learning Mechanisms in Smoking*. Chicago, Aldine Publishing Company, 1970, 237 pp.
- (169) HUNT, W.A. (Editor). New approaches to behavioral research on smoking. *Journal of Abnormal Psychology* 81(2): 107-198, April 1973.
- (170) HUNT, W.A., BARNETT, L.W., BRANCH, L.G. Relapse rates in addiction programs. *Journal of Clinical Psychology* 27(4): 455-456, October 1971.
- (171) HUNT, W.A., BESPALC, D.A. An evaluation of current methods of modifying smoking behavior. *Journal of Clinical Psychology* 30(4): 431-438, October 1974.
- (172) HUNT, W.A., MATARAZZO, J.D. Habit mechanisms in smoking. In: Hunt, W.A. (Editor). *Learning Mechanisms in Smoking*. Chicago, Aldine Publishing Company, 1970, pp. 65-106.
- (173) HYND, G.W., CHAMBERS, C., STRATTON, T.T., MOAN, E. Credibility of smoking control strategies in non-smokers: Implications for clinicians. *Psychological Reports* 41(2): 503-506, October 1977.
- (174) HYND, G.W., O'NEAL, M., SEVERSON, H.H. Cardiovascular stress during the rapid-smoking procedure. *Psychological Reports* 39(2): 371-375, October 1976.
- (175) HYND, G.W., STRATTON, T.T., SEVERSON, H.H. Smoking treatment strategies, expectancy outcomes, and credibility in attention-placebo control conditions. *Journal of Clinical Psychology* 34(1): 182-186, January 1978.