

Long-term Evaluation of Controlled Smoking as a Treatment Outcome

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Summary

Smoking abstinence rates and mean daily cigarette consumption were observed in 1326 participants in a group cessation program before, immediately after, and one year after treatment. At the end of treatment 62% of the 'treatment successes' were abstinent. A further 18% were smoking 1-9 cigarettes per day and were termed 'controlled smokers'. The mean reductions in cigarettes smoked per day from pre-treatment baseline to the one-year follow-up were compared for immediate post-treatment consumption groups. The long-term reduction of controlled smokers was less than the treatment successes, but was not different from those smoking larger quantities at the end of treatment. The fact that the long-term reduction of controlled smokers was no greater than others suggests that controlled smoking is not useful, either as a treatment goal or outcome.

Introduction

Analogical reasoning is often a fruitful source of hypotheses. In the realm of alcohol abuse the treatment goal which Heather & Robertson (1983) label controlled drinking has achieved credibility since the efforts of Sobell and Sobell (1978). Advocates of controlled drinking as a goal in treating alcohol abusers argue that those who achieve low levels of drinking at the end of treatment are less likely to revert to high levels in the long term than those for whom successful treatment means abstinence. One rationale for this empirical finding is what Marlatt (1978) calls the abstinence violation effect. Abstinence places pressure on the patient; a single lapse leads to feelings of failure and guilt resulting in renewed heavy drinking.

It would seem plausible, then, to hypothesize that

controlled smoking might be a reasonable criterion for successful completion of a treatment program. The best test of the controlled smoking hypothesis would be a randomized trial in which smokers were assigned to treatments for which the goals were either reduction of smoking to some criterion, or total abstinence. Such a study could be considered unethical since the controlled smoking treatment goal would almost certainly leave subjects exposed to significant hazard. The relative risk for cancer of smoking even as few as 1-9 cigarettes a day has been reported to be at least several times that of non-smokers (US Department of Health Education and Welfare, 1979). Yet smoking cessation practitioners know that an immediate treatment outcome for many of their clients is reduced smoking. If this reduction were maintained in the long term the health risk of smoking would be at least proportionately reduced.

The question explored here concerns the long term prognosis of smokers who have not stopped but who have achieved a low level of smoking at the end of treatment. Only in a large-scale study would

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one be likely to obtain enough post-treatment 'controlled' smokers to evaluate the hypothesis. Their prognosis will be compared to that of persons who have achieved abstinence. It will also be compared with that of the participants who continued to smoke without reaching a low level of cigarette consumption.

Method

Subjects in this study were 1527 smokers (42% males and 58% females) who enrolled in an ongoing smoking cessation course called Fresh Start offered to the public in Victoria, Australia by the Anti-Cancer Council of Victoria (ACCV) in 1983-1985. The mean age of subjects was 38.7 years ($SD=11.6$). Fresh Start is a 4-week, 2-hour by eight-session group program led by facilitators who are trained and accredited by the ACCV. The groups are run throughout the State of Victoria under the auspices of local health agencies such as hospitals and community health centres. Participants are attracted by local media advertizing, brochures, posters and 'word of mouth'. Fresh Start also receives publicity as a by-product of a State-wide annual anti-smoking media campaign and at this time extra courses are scheduled to meet demand. A condition of accreditation to run Fresh Start courses is that all participants shall be registered with the ACCV which manages all follow up contact with participants.

The methods used in Fresh Start are principally cognitive. The first aim is to produce an understanding of the health risks and the psychological functions of smoking for each individual. The second aim is to devise personal strategies for getting off and staying off cigarettes (Anti-Cancer Council of Victoria, 1983). Groups in this study varied in size from 2 to 19 with a median of 8, and were conducted by different facilitators at 56 locations throughout Victoria. Total abstinence by the end of the course (4 weeks after commencement) is the immediate treatment objective, with permanent abstinence being the long-term goal.

All Fresh Start participants were requested to complete an entry questionnaire and additional questionnaires at each of the following points in time: the end of the course, one month, 6 months and one year after the end of the course. Follow-up data were self-reported and were obtained by mailed survey and telephone contact. In addition to recording age, sex and marital status, information was

obtained on previous and current smoking, including the number of cigarettes smoked per day. Participants paid A\$45 to attend the full course plus A\$5 deposit which was refunded when all the questionnaires were returned. The mean number of cigarettes smoked at entry was 28.2 ($SD=12.6$) daily.

Of the original participants, 3 died and 198 did not complete the end-of-treatment questionnaire. Therefore the analysis is confined to the 1326 subjects for whom post-treatment scores were available. This number includes all those present at the last session of the course plus those not present who responded to a mailed post-treatment questionnaire. While those who dropped out during this phase must be regarded as treatment failures, they are not relevant to an evaluation of controlled smoking.

For the analysis below we have categorized participants by their smoking status at the end of treatment as treatment successes (zero cigarettes per day), controlled smokers (1-9 per day), and three other groups who smoked 10-19, 20-29 or 30 or more cigarettes per day.

Results

The mean reduction in smoking between the pre-treatment baseline of 28.1 cigarettes per day and at the one-year follow-up was 36.5% or 10.4 per day ($SD=13.9$). This reduction in number of cigarettes smoked per day was highly significant ($t=27.3$, $d.f.=1325$, $p<0.001$). In order to test the hypothesis that large immediate reductions in daily consumption predict large reductions in the long term, subjects were divided into four groups depending upon how much they were smoking at the end of treatment. As can be seen in Table 1, there were 817 (61.6%) who had stopped smoking and were regarded as treatment successes, 18% were practising controlled smoking (1-9 per day), with 8.2% smoking 10-19 per day, 8.1% 20-29 per day and 4% 30 or more per day.

Table 1. Cigarettes per day (CPD) Smoked by Participants at End of Treatment

0*	1-9**	10-19	20-29	30+	Total
817	239	109	108	53	1326
61.6%	18%	8.2%	8.1%	4%	100%

*'treatment successes'

**'controlled smokers'

The relationship between initial and long-term reduction in cigarette consumption is shown in Figure 1. In this, the mean percentage reduction in daily cigarette consumption between pre-treatment baseline and one year is plotted for each immediate post-treatment category. As expected, the greatest reduction was found among those treatment successes who had achieved abstinence by the end of treatment. As a group, the mean percentage reduction was 48.8% or 13.4 cigarettes per day (SD=14.7) and this was a highly significant change ($t=26.1$, $d.f.=816$, $p<0.001$).

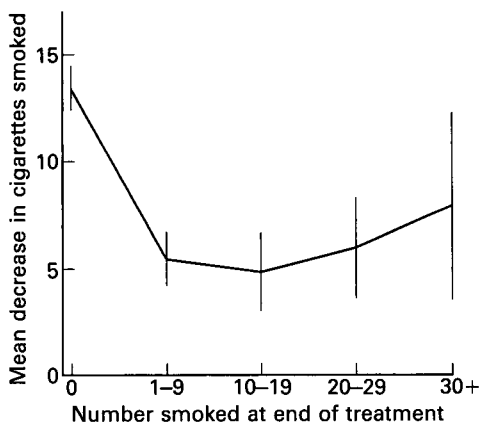


Figure 1. Mean decrease in number of cigarettes per day reported between beginning of course and one-year follow up, according to number smoked at end of treatment, with 95% confidence limits.

Contrary to expectations under the controlled smoking hypothesis, it was not the controlled smokers (1-9 per day post-treatment) who achieved the next lowest percentage reduction in the long term. In fact, it was the least controlled smokers who achieved the largest reductions at one year, although there was no significant difference between the means of the four non-zero groups ($F=1.014$, $d.f.=3,506$, $p>0.4$).

It is possible that considering only the means, as

in Figure 1, would conceal a sub-group of smokers who were using controlled smoking as a stepping stone towards total abstinence. To explore this possibility, abstinence rates at one year, cross-tabulated by immediate post-treatment consumption levels were examined, as in Table 2. It can be seen that the initial treatment successes were also by far the most successful in the long term, with 40.4% abstinent at one year. However, although long-term abstainers were found in all categories of treatment failure, the percentage of long-term abstainers among the controlled smokers (5%) was no higher than any of the other groups.

In presenting these results it was necessary to make a decision about the 20.9% of participants who were not available for follow-up. We have included them in the no change category, in accordance with the recommendation of Shewchuck & Wynder (1977) that those who make themselves unavailable to follow-up be regarded as treatment failures. Excluding them from the data set diminishes the differences between post-treatment abstainers and smokers slightly.

Discussion

The observations made in this study indicate that low non-zero levels of post-treatment smoking do not lead to better results than higher levels of post-treatment smoking. This suggests that the controlled smoking hypothesis is not viable, although perhaps a reservation is in order. In this study, abstinence rather than control was stressed as a long-term goal. A mechanism similar to Marlatt's (1978) abstinence violation effect may well have had a role in the poor performance of those who were still smoking after treatment.

Direct tests of the controlled smoking hypothesis have been carried out in small-scale studies by Foxx & Axelroth in 1983 ($n=12$) and by Glasgow, Klesges, Klesges, Vasey & Gunnarson in 1985 ($n=48$). The treatment in both studies specifically allowed for participants to have reduction in smok-

Table 2. Percent Abstinent After One Year by Cigarettes per day at End of Treatment

Smoking status after one year	Number smoked at end of treatment					Total
	0	1-9	10-19	20-29	30+	
Abstinent	40.4%	5.01%	8.3%	4.6%	9.4%	27.12%
Smoking	59.6%	95%	91.7%	95.4%	90.6%	71.8%

ing as a goal. The participant expressed the feeling that quitting was either too difficult or not particularly desirable for him or her. The results of these studies are consistent with the present data in that post-treatment non-abstainers typically relapsed during the follow-up interval.

It may be noted that abstinence is a medically more appropriate treatment goal for smoking than for alcohol. Low levels of alcohol consumption are considered cardioprotective (Kaplan, 1981). On the other hand, the damage done by tobacco is directly linked to the amount consumed, even at low levels, and there appears to be no safe threshold (U.S. Department of Health, Education, and Welfare, 1979). Further, laboratory evidence has also shown that habitual smokers compensate for reduced consumption by taking in more toxins per cigarette (Ho-Yen, Spence, Moody & Walker, 1982). This tendency to compensate, presumably by deeper inhaling and more puffs, was confirmed in the large, long-term follow up of smokers in the MRFIT study (Neaton, Broste, Cohen, Fishman, Kjelsberg & Schoenberger, 1981; Jarvis, West, Tunstall-Pedoe & Vesey, 1984). These authors showed that self-reported reductions in numbers of cigarettes per day were not commensurate with reductions in smoke exposure as indicated by plasma thiocyanate.

These data from the Fresh Start program are consistent with those of Hughes, Hymowitz, Ockene, Simon & Vogt (1981) who studied a large number of patients at high risk for heart disease over a 4-year period. Of the 47% of patients who stopped smoking at the end of the 4-month intensive treatment period, 56% reported no smoking over the four years. Of those who did not quit by the end of the intensive treatment, 58% never quit and only 14% were non-smokers at the end of the evaluation.

Our findings contrast with results from a comparison made by Raw & Russell (1980) between 9 smokers who reduced their smoking 75%–99% after treatment and 25 smokers who cut down by less than this proportion. These authors found that the smokers who cut down by more than 75% maintained a greater reduction to one year than those who did not reduce as much. As well as being different in having much smaller numbers than the present study, the entry characteristics of Raw & Russell's subject may have been different. Only half were self-referred, the other half being referred by a doctor. The desire of the latter group to give up could be lower than an entirely self-selected group, such as Fresh Start participants. The unusually lower post-treatment abstinence rates (24%) and

one-year follow-up results (14%) are consistent with relatively low initial motivation.

One might ask if the post-treatment abstinence which in our study predicts long-term success depends on the initial level of smoking. Hughes *et al.* (1981) reported that light smokers were more likely to quit than heavy smokers. In the present case, most (73%) of those smoking 1–9 cigarettes per day were indeed likely to be abstinent after treatment, but 60% of those smoking a pack or more per day also attained abstinence; and 84% of the participants were in this latter, heavy-smoking group. Thus initial level is not nearly as important a predictor as is whether a zero level was reached after treatment.

The quantitative results are naturally dependent upon the validity of the self-reports furnished by the respondents. However, even if the responses were distorted in the 'faked good' direction, our main conclusion would not be threatened. This conclusion is based on the comparison at one year of those who reported varying non-zero levels of consumption immediately after treatment. To explain our results in terms of faking requires the implausible proposition that some people fabricate an early reduction in smoking but after a year revert to giving answers as honest as those who did not falsely claim to have cut down at the beginning.

The long term results given here are similar to those commonly found (Leventhal & Cleary, 1980), in that some 30% of the smokers report abstinence after one year. It has been shown that achieving abstinence after treatment is crucial in attaining the desirable long-term consequence. Perhaps those who do not achieve the stated goal after treatment become discouraged. While longer-term follow-up is always an advisable research goal, the present results suggest that reasonable projections can be made after a relatively brief period of observation.

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References

- ANTI-CANCER COUNCIL OF VICTORIA (1983) *Fresh Start—A Stop Smoking Program* (Melbourne, Anti-Cancer Council of Victoria).
- FOXX, R. M. & AXELROTH, E. (1983) Nicotine fading, self-monitoring, and cigarette fading to produce cigarette abstinence or controlled smoking, *Behaviour Research and Therapy*, 21, pp. 17-27.
- GLASGOW, R. E., KLESGES, R. C., KLESGES, L. M., VASEY, M. W. & GUNNARSON, D. F. (1985) Long-term effects of a controlled smoking program: a 2½ year follow-up, *Behavior Therapy*, 16, pp. 303-307.
- HEATHER, N. & ROBERTSON, I. (1983) *Controlled Drinking* (London, Methuen).
- HO-YEN, D. O., SPENCE, V. A., MOODY, J. P. & WALKER, W. F. (1982) Why smoke fewer cigarettes? *British Medical Journal*, 284, pp. 1905-1907.
- HUGHES, G. H., HYMOWITZ, N., OCKENE, J. K., SIMON, N. & VOGT, T. M. (1981) The multiple risk factor intervention trial (MRFIT) V. Intervention on smoking, *Preventive Medicine*, 10, pp. 476-500.
- JARVIS, M., WEST, R., TUNSTALL-PEDOE, H. & VESEY, C. (1984) An evaluation of the intervention against smoking in the Multiple Risk Factor Intervention Trial, *Preventive Medicine*, 13, pp. 501-509.
- KAPLAN, N. M. (1981) Management strategies in hypertension, in: B. M. BRENNER & J. H. STEIN (Eds) *Hypertension* (New York, Churchill Livingstone).
- LEVENTHAL, H. & CLEARY, P. D. (1980) The smoking problem: A review of the research and theory in behavioural risk modification, *Psychological Bulletin*, 88, pp. 370-405.
- MARLATT, G. A. (1978) Craving for alcohol, loss of control and relapse: a cognitive-behavioural analysis, in: P. E. NATHAN, G. A. MARLATT & T. LOBERG (Eds) *Alcoholism: New Directions in Behavioural Research and Treatment* (New York, Plenum).
- NEATON, J. D., BROSTE, S., COHEN, L., FISHMAN, E. L., KJELSBERG, M. O. S. & SCHOENBERG, J. (1981) The Multiple Risk Factor Intervention Trial (MRFIT). VII. A comparison of risk factor changes between two study groups, *Preventive Medicine*, 10, pp. 519-543.
- RAW, M. & RUSSELL, M. A. H. (1980) Rapid smoking, cue exposure and support in the modification of smoking, *Behaviour Research and Therapy*, 18, pp. 363-372.
- SHEWCHUK, L. A. & WYNDER, E. L. (1977) Guidelines on smoking cessation clinics, *Preventive Medicine*, 6, pp. 130-133.
- SOBELL, M. B. & SOBELL, L. C. (1978) *Behavioural Treatment of Alcohol Problems* (New York, Plenum).
- U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE (1979) *Smoking and Health: A Report of the Surgeon General*. DHEW Publication No. PHS 79-50066, Washington: U.S. Government Printing Office.

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