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Electrical Aversion Therapy with Alcoholics: A Comparative Follow-up Study

By J. H. GLOVER and P. A. McCUE

Summary. A group of alcoholics treated by partially reinforced electrical escape conditioning were found to have a significantly better outcome on follow-up than a selected control group, who showed a parallel level of motivation, and were treated by conventional methods. No sex differences in outcome were found for either group. In the experimental group, better prognosis was associated with higher social class and older age, and poorer prognosis with single marital status. There were no variations in outcome for age in the control group. In the age range 20–40 aversion therapy showed no better results than conventional therapies, but with subjects above this age range it was very significantly superior. The results are discussed with reference to the application of aversion therapy to alcoholism.

Introduction

Follow-up studies on the outcome of conventional methods for the treatment of chronic alcoholism (in-patient 'drying out', group therapy, prescription of Antabuse or Abstem and encouraged membership of Alcoholics Anonymous) tend only to confirm the image of the alcoholic as 'the therapist's worst friend'. Vallance (1965), in a two-year follow-up study of patients given 'first-aid' treatment in a general hospital, found 25 per cent improved (including only 3 abstinent), 44 per cent not improved and 31 per cent worse. Gerard *et al* (1962) found that less than 19 per cent of 299 patients treated by conventional methods in a variety of clinics were abstinent for a year following therapy.

The earlier, promisingly successful use of chemical emetic conditioning (Lemere and Voegtlin, 1950) has now largely given way to electrical aversion, perhaps mainly because of criticism of emetics as effective conditioners (Rachman, 1965). Perhaps nausea and vomiting have less impact on the alcoholic because they are a very common part of alcoholic behaviour itself. Several paradigms of electrical aversion therapy have been used, with varying results; Lovibond and Caddy (1970) report successful outcome with aversive control of subjects' monitoring of their own blood alcohol level. Using operant conditioning of drinking behaviour in simulated bar-room and home settings, Sobell and Sobell (1973a, 1973b) found their controlled drinking and non-drinking groups to be functioning significantly better than controls up to two years later. Conversely, MacCulloch *et al* (1966) found a classical paradigm of anticipatory avoidance conditioning unsuccessful with alcoholics. Blake (1965, 1967), using partially reinforced escape conditioning, found that 56 per cent of his 59 subjects were abstinent (22) or improved (11) at a minimum of 12 months' follow-up. Blake's impressive results have been criticized, however, (Lunde and Vogler, 1970; O'Leary and Wilson, 1975) on the ground that his subjects were fee-paying patients of predominantly social classes I and II, a group which has been shown to have the best prognosis regardless of type of treatment used (McCance and McCance, 1969). Also, Blake's study did not include any control group.

The purpose of the present study was to re-examine the effectiveness of the escape conditioning procedure used by Blake (with certain minor modifications) with a group of alcoholics unbiased towards upper social class,

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compared to the outcome in a control group treated by conventional methods. One modification was that Blake gave training in muscle relaxation to all subjects in one of his experimental groups and to none in the other. Only selected patients in the present study, for whom anxiety-reduction appeared to be a significant factor in the aetiology of their alcoholism, were given relaxation training.

Method

A total of 48 in-patients were accepted for aversion therapy as part of the provision of a clinical psychological service in an adult psychiatric hospital. The mean age of the total group at the time of therapy was 44·1 years (range: 21–64 years). Their acceptance for aversion therapy was conditional on clear evidence of primary alcoholism in the absence of functional psychosis, on their acknowledgement of alcoholism (or 'having a drinking problem' or other euphemisms), and on their expression of an intention or wish to stop drinking. The group had a mean of 1·8 previous hospital admissions related to alcoholism (with a mean of 6·9 weeks' previous stay in hospital per patient). They showed a pattern, as did the control group, of predominantly gamma-type drinking (loss of control) rather than delta (inability to abstain) drinking (Jellinek, 1960). This gamma-drinking pattern may be seen as mirroring the emphasis in the Scottish culture on a drinker's ability to 'hold' large quantities of liquor. Also, the hospital's catchment area is to a large extent a mining area, with a considerable number of working men's clubs, which for many communities are the main, or even only, social focus. Heavy drinking is usual in such clubs.

Of patients referred as possible candidates for aversion therapy, the great majority—approximately 7 out of 8—were taken on, the remainder either declining treatment when offered it or being considered unsuitable by the therapist, on the criteria delineated earlier in this section.

Because of the clinical basis of referrals, random assignment to the treatment/non-treatment groups was not possible. The control group of patients who had receiving conventional forms of therapy for alcoholism, were chosen according to criteria indicating a level of motivation for treatment corresponding to that of the aversion therapy group; namely (a) acknowledgement of alcoholism or an alcohol problem, (b) more than ten days' stay in hospital, (c) few, if any, lapses from abstinence while in hospital, and (d) expression of a wish to stop drinking. The controls were matched with the aversion therapy group for age at relevant admission (mean age: 44·3 years; range: 24–63 years), sex ratio, mean follow-up interval (see below) and absence of evidence of functional psychosis. The control group comprised 29 per cent of the total number of patients with a primary diagnosis of alcoholism admitted to the hospital over a ten-month period.

For both aversion therapy and control groups, follow-up information was obtained from at least one of the following sources: (a) interview, postal or telephone communication with the patient; (b) interview, postal or telephone communication with relatives; (c) evidence obtained at psychiatric out-patient follow-up; (d) information from the general practitioner; (e) information from other sources, such as the police, the community psychiatric nursing service and social workers. For 86 per cent of cases the information determining outcome classification was obtained from a personal interview between the patient and at least one of the following: general practitioner, psychiatrist, social worker, clinical psychologist or community nurse. In only one case, where no other information could be obtained, was follow-up classification based solely on a letter —from a female patient's husband.

Six months was chosen as the minimum follow-up interval for both the aversion therapy and control groups, following Glatt's (1961) finding that 90 per cent of his group of relapsed alcoholics relapsed within this period.

Procedure

Whenever possible treatment was begun at least ten days after admission, when most patients had overcome the worst of their withdrawal symptoms. Following acceptance for aversion therapy, all subjects were given a

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session of motivation-arousal centring on the adverse consequences of their drinking in terms of deteriorated social and family relationships, economic and employment difficulties, trouble with the police (in some cases) and physiological damage. It is interesting to note that although the great majority of the group had proven physiological signs, including peripheral neuritis and liver damage, it appeared to come as a genuine shock to many of them that these conditions were consequent upon alcohol abuse. Subjects were encouraged to see abstinence as the easiest and least stressful solution to their problem of addiction to alcohol. They were warned that aversion therapy, in common with other treatments for alcoholism, could not make them confident of being able to return to a social drinking level.

During aversion sessions, subjects sat midway along a desk, facing towards a coloured light (the non-reinforcing stimulus). The therapist sat at the other end of the desk from the light, behind the subject. Shocks were administered to the inner surface of the subject's wrist, on the arm customarily used for drinking. Shocks were delivered at a strength above the subject's reported pain threshold, and at a level which produced some visible flexion of the wrist. Adjustments of shock level were sometimes made within sessions to increase subjective uncertainty. Upward adjustments in shock strength were usually necessary from session to session owing to habituation.

The procedure (partially reinforced escape conditioning) was carried out to a 240 trial schedule developed by Blake, with an overall ratio of 1 : 1 reinforced/non-reinforced trials. However, over the sessions, the ratio varied from an initial 1 : 1 to a maximum of 4 : 1 shock/no shock, the final ratio being 1 : 4. The rationale is that a low ratio of partial reinforcement in the closing stages of therapy should increase resistance to extinction. The alcoholic beverage or beverages used reflected the subject's avowed preference (with confirmation wherever possible from other sources). Subjects were instructed to take a sip and hold it in the mouth until either the light or the shock came on. Termination of spitting out into a bowl resting on the subject's lap produced immediate switching off of the shock or light. In operant learning terms, the shock is a negative reinforcer in that its cessation, brought about by spitting out of alcohol, tends to strengthen the escape (spitting out) response on subsequent trials. At the same time, the shock can be seen as an unconditioned stimulus in a classical conditioning paradigm in which the anticipatory anxiety and pain associated with being shocked are associated with the conditioned stimulus, the alcoholic beverage. The mean time latency between sip intake and onset of shock or light was 5 seconds (range: 3–7 seconds). Conversation during sessions was not encouraged, unless related to the subject's expression of negative aspects of his past drinking. In a further attempt to extinguish alcoholic drinking behaviour, subjects were encouraged to leave at least a minute between sips, and to take small sips as against mouthfuls (Sobell *et al*, 1972). To aid aversive generalization, the bottles used in each session were placed in a prominent position before the patient.

The 240 trial aversion programme was given over a mean of 11·9 sessions (range: 7–24), the average duration of a session being 45 minutes. Sessions were generally given daily.

Signs of progressive conditioning commonly noticed in the latter stages of aversion sessions included: increasing delay or slowness in the patient's stretching out to raise the glass for the next sip, an increasingly rapid spitting-out response to light as well as shock, and increasing efforts to spit out residual alcohol in the mouth. The patient sometimes commented spontaneously at this stage that the taste of the alcohol had become unpleasant. Subjects were warned that any alcohol consumed outside the treatment situation, during the period in which they were having therapy, would tend to cancel out its effects; in the initial stages of the course at least, weekend leave was, as a rule, not allowed.

The experimental situation was simpler than Blake's, which involved the use of a one-way mirror and simulated bar.

Subjects who appeared to have been using alcohol to reduce anxiety symptoms were given training in muscle relaxation, using a modifica-

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tion of Jacobson's (1964) programme. A mean of 2·4 sessions of relaxation training were given to each of these subjects.

Results

The patients were alloted to one of three categories on the basis of the follow-up evidence. The categories were:

1. Abstinent—no alcohol consumed since discharge from hospital.
2. Controlled—patient's drinking habits are under his voluntary control and not excessive. Improvement is shown in social and family relationships, physical health, employment level and family economics.
3. Unimproved—the patient has relapsed into uncontrolled drinking during some or all of the follow-up period. There is evidence of deterioration in social and family relationships, etc.

Out of the total group accepted for aversion therapy (N = 48) seven patients (4 males and 3 females) withdrew from treatment after a mean of 3·1 aversion sessions. On follow-up two were controlled and five unimproved. A further patient was transferred directly after treatment to a long-stay ward; as he has been subject to supervision, his outcome cannot be meaningfully assessed. Also, one patient in this group was untraceable on follow-up. Exclusion of these nine patients gives an experimental group (N = 39) of patients who completed a full course of aversion therapy and on whom follow-up data were obtained. The mean interval between treatment and follow-up for this group was 13·8 months (range: 6–47 months). Two of the experimental group patients were given a further booster course of eight sessions (120 trials) on relapse following their initial course. On follow-up, counted as from date of booster course, one patient, male, was abstinent, while the other, female, was a controlled drinker.

For the control group (N = 46) the mean follow-up interval was 13·3 months (range: 6–19 months). This excludes three patients who were untraceable on follow-up.

Table I gives the comparison of outcome between the experimental group and the control group. The experimental group were significantly improved by comparison to the control group.

For further comparisons, it was necessary to combine the abstinent and the controlled groups so as to meet the criteria for either the chi square test or Fisher's Exact Probability Test (Siegel, 1956). The two-tailed test was used in all comparisons. There were no significant differences in the outcome with regard to sex, either for the follow-up experimental group (Fisher's Test, $P = 0{\cdot}15$) or for the control group (Fisher's Test, $P = 0{\cdot}13$). Similarly, there were no significant differences in the control group with regard to age, either by comparing outcome above and below the median ($\chi^2 = 0{\cdot}61$, $P < 0{\cdot}5$), or by dividing the group about age 40 ($\chi^2 = 0{\cdot}66$, $P < 0{\cdot}5$).

For the experimental group there was evidence that age was a significant factor. Table II gives a comparison of the outcome when the experimental group is divided about the age 40. The indication is that the older age range fare significantly better than the younger.

If these two age ranges are looked at separately as in Table III, there is no significant difference between the outcome of the experi-

Table I

Comparison of outcome between experimental and control groups

	Abstinent		Controlled		Unimproved		Totals
	Male	Female	Male	Female	Male	Female	
Experimental group ..	7	5	8	5	11	3	39
Control group ..	2	2	7	4	23	8	46
Totals	9	7	15	9	34	11	85

χ^2 (combined sexes) = 10·09, df 2, $P < 0{\cdot}01$

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TABLE II

Experimental group: outcome for age

Classification		Age 40 and below	Age 41 and above
Improved	Abstinent	1	11
	Controlled	2	11
Unimproved		9	5
Totals		12	27

Fisher's Exact Test: P = 0·001

mental and control groups for those patients aged 40 and below. However, for patients aged over 40 the outcome was significantly different. Twenty-two out of the 33 patients rated as improved came from the experimental group, and conversely only 5 of the unimproved patients were from the experimental group.

The 15 patients of the follow-up experimental group who were given training in muscle relaxation were compared with those patients who had not received relaxation training. The differences were not significant ($\chi^2 = 0{\cdot}48$, $P < 0{\cdot}5$).

Further examinations of the experimental group were carried out. The outcome for the 24 patients who had previous alcoholism-related admissions was compared with that for the 15 patients who had no such previous admissions. No significant difference between the outcomes was noted ($\chi^2 = 1{\cdot}25$, $P < 0{\cdot}3$). In addition, the patients were assigned to their social class according to the criteria of the Registrar General (1970). Table IV shows the outcome for these patients. For statistical purposes these categories were combined. Comparison between classes I–II and III–V showed a significant difference in outcome.

Table V shows the marital status of the follow-up experimental group at the time of undergoing therapy, and the follow-up findings. No significant difference was found between the outcomes for the married subgroup as against the other subgroups combined. However, comparison between the single subgroup and the others showed a significant difference. The single patients are not predominantly in the younger age group.

No significant differences were found when the abstinent subgroup (n = 12) of the follow-up experimental group were compared with the controlled subgroup (n = 13) of that group in terms of age, sex, social class, previous admissions as against none, relaxation training as against none, and marital status.

DISCUSSION

The findings of the present study support the usefulness of electrical aversion therapy, on a paradigm of partially reinforced escape conditioning, in the treatment of alcoholism. There was 53 per cent improvement on follow-up for the total group who embarked on aversion, and of those who completed their course of aversion, 64 per cent showed improvement (abstinence or controlled drinking). The control group, who had received conventional treatments, and were chosen as being comparable to the experimental group in terms of motivation to overcome their alcoholism, showed improvement in 33 per cent of cases on follow-up, significantly below the figure for the experimental follow-up group.

TABLE III

Comparison of outcome between experimental and control groups in relation to age

Classification	Age 40 and below			Age 41 and above		
	Experimental group	Control group	Totals	Experimental group	Control group	Totals
Improved ..	3	4	7	22	11	33
Unimproved ..	9	12	21	5	19	24
Totals ..	12	16	28	27	30	57

Fisher's Exact Test: P = 0·34 $\chi^2 = 11{\cdot}7$, $P < 0{\cdot}001$

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TABLE IV

Experimental group: outcome related to social class

Classification		I	II	III	IV	V
Improved	Abstinent	1	3	5	3	—
	Controlled	—	2	8	2	1
Unimproved		—	—	6	4	4
Totals		1	5	19	9	5

Fisher's Exact Test: P = 0·05

The absence of sex differences in outcome for either the experimental or the control groups is at variance with the findings of previous studies (e.g. Pemberton, 1967) that female alcoholics are a therapeutically intransigent group. For the group who completed aversion therapy, status on follow-up was not affected by whether they had or had not been in hospital previously because of alcoholism, nor by whether or not they were given training in muscle relaxation, which was given selectively in cases where anxiety-reduction appeared to have been a significant factor in alcohol abuse. Blake (1967) found no statistically significant difference between a group given aversion alone and one given relaxation training in addition, but commented that outcome suggested some slight advantage for relaxation training. Consistently with previous findings (McCance and McCance, 1969), experimental patients in social classes I and II showed a significantly better outcome than those in classes III, IV and V. Examination of marital status for the group who completed aversion indicates that unmarried patients have a poorer prognosis than those who are or have been married.

The findings on outcome with regard to age are of particular interest; among the group completing aversion therapy those aged 41 and above showed a markedly better outcome than those in the younger age range, 20–40, whereas no differences in outcome for age were found in the control group. Comparison between the two groups indicates that for patients aged 40 and below, aversion does not produce better results than conventional treatments, but that it does produce a clear enhancement of outcome for those aged above 40. The authors suggest as an explanation (which would be amenable to further research) that the popular image of an alcoholic is of a middle-aged person, and that consequently patients in their 40s and above who agreed to have aversion treatment were more willing than those in their 20s and 30s to accept the identity of a person addicted to alcohol who needed to 'kick the habit' and found in aversion a 'push' to enable them to do so.

In view of the fact that one condition of acceptance for aversion was patients' avowed wish to stop drinking, it is interesting that in the follow-up experimental group 13 patients had attained controlled drinking as against 12 abstinent. No significant differences were found between these subgroups on a number of parameters (see under Results). The aversive procedure used was aimed at suppressing drinking behaviour rather than merely averting subjects to the tastes of specific forms of alcohol, and there is evidence that it was effective in this way, in that only two subjects (both unimproved) resorted to other forms of alcohol than those to which they had been averted.

TABLE V

Experimental group: outcome related to marital status

Classification		Single	Married	Separated	Divorced	Widowed
Improved	Abstinent ..	—	10	—	—	2
	Controlled ..	2	6	3	1	1
Unimproved		5	7	1	1	—
Totals		7	23	4	2	3

Single vs. other subgroups: Fisher's Exact Test: P = 0·04
Married vs. other subgroups: χ^2 = 0·26, NS

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Arguably, the distinction between total abstinence and controlled drinking is artificial. For example, an alcoholic whose daily drinking previously began perhaps mid-morning or even before breakfast, and who attains controlled drinking following treatment, is to a considerable degree practising abstinence if he does not go to the pub for a drink before 9.00 pm. Reinert and Bowen (1968) pointed out the extent to which social-drinking 'ex-alcoholics' have to exert rigid temporal and locational control on their drinking.

As to how aversion therapy works, the authors readily acknowledge that there are effects, notably cognitive ones, additional to those of conditioning alone. An 'extinction' theory, that electric shock is superfluous in that drinking behaviour is reinforced by the pleasant effects of alcohol and is therefore extinguished during therapy by the patient's taking sips of alcohol without feeling its reinforcing effects, is contradicted by the finding of Vogler, Lunde *et al* (1970). In their study, a sham conditioning control group (told that they might or might not receive shocks to sips of alcohol but not in fact shocked) showed significantly poorer outcome than a group given electrical escape conditioning.

Following the observation of Marks and Gelder (1967) that after electrical aversion subjects reported feeling 'indifference' rather than 'anxiety' in the presence of the stimuli to which they had been averted, the effect of aversion therapy on alcoholism may be seen as that of reducing a very strong drive, with both psychological and physiological characteristics, to a level at which the patient can feel relative indifference to alcohol-related stimuli. Associated with this will be a restructuring of cognitive frameworks regarding alcohol; for example, one patient, who had been abstinent apart from three minor lapses since a course of aversion nearly four years previously, reported that he still kept a bottle of whisky in a living-room cupboard, mainly to show himself that he could have it available but do without it.

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References

Blake, B. G. (1965) The application of behaviour therapy to the treatment of alcoholism. *Behaviour Research and Therapy*, 3, 75–85.

—— (1967) A follow-up of alcoholics treated by behaviour therapy. *Behaviour Research and Therapy*, 5, 89–94.

Gerard, D. L., Saenger, G. & Wile, R. (1962) The abstinent alcoholic. *Archives of General Psychiatry*, 6, 83–95.

Glatt, M. M. (1961) Treatment results in an English mental hospital alcoholic unit. *Acta Psychiatrica Scandinavica*, 37, 143–68.

Jacobson, E. (1964) *Anxiety and Tension Control*. Philadelphia: J. B. Lippincott Co.

Jellinek, E. M. (1960) *The Disease Concept of Alcoholism*. New Haven, Connecticut: Hillhouse Press.

Lemere, F. & Voegtlin, W. L. (1950) An evaluation of the aversion treatment of alcoholism. *Quarterly Journal of Studies on Alcohol*, 11, 199–204.

Lovibond, S. H. & Caddy, G. (1970) Discriminated aversive control in the moderation of alcoholics' drinking behaviour. *Behaviour Therapy*, 1, 437–44.

Lunde, G. E. & Vogler, R. E. (1970) Generalisation of results in studies of aversion conditioning with alcoholics. *Behaviour Research and Therapy*, 8, 313–14.

McCance, C. & McCance, P. F. (1969) Alcoholism in North-East Scotland: its treatment and outcome. *British Journal of Psychiatry*, 115, 189–98.

MacCulloch, M. J., Feldman, M. P., Orford, J. E. & MacCulloch, M. L. (1966) Anticipatory avoidance learning in the treatment of alcoholism: a record of therapeutic failure. *Behaviour Research and Therapy*, 4, 187–96.

Marks, I. M. & Gelder, M. G. (1967) Transvestism and fetishism: clinical and psychological changes during faradic aversion. *British Journal of Psychiatry*, 113, 711–29.

O'Leary, K. D. & Wilson, G. T. (1975) *Behavior Therapy: Application and Outcome*, p 360. New Jersey: Prentice-Hall.

Pemberton, D. A. (1967) A comparison of the outcome of treatment in female and male alcoholics. *British Journal of Psychiatry*, 113, 367–74.

Rachman, S. (1965) Aversion therapy: chemical or electrical? *Behaviour Research and Therapy*, 2, 289–99.

Registrar General (1970) Classification of Occupations. HMSO, Population Censuses and Surveys Office.

Reinert, R. E. & Bowen, W. T. (1968) Social drinking following treatment for alcoholism. *Bulletin of the Menninger Clinic*, 32, 280–90.

Siegel, S. (1956) *Nonparametric Statistics for the Behavioral Sciences*. New York: McGraw-Hill.

Sobell, M. B., Schaefer, H. H. & Mills, K. C. (1972) Differences in baseline drinking behaviour between alcoholics and normal drinkers. *Behaviour Research and Therapy*, 10, 257–67.

https://doi.org/10.1192/bjp.130.3.279 Published online by Cambridge University Press

SOBELL, M. B. & SOBELL, L. C. (1973a) Individualised behaviour therapy for alcoholics. *Behaviour Therapy*, 4, 49–72.

—— —— (1973b) Evidence of controlled drinking by former alcoholics: a second year evaluation of individualised behaviour therapy. Paper presented at the 81st Annual Convention of the American Psychological Association, Montreal, 31 August.

VALLANCE, M. (1965) Alcoholism: a two-year follow-up study. *British Journal of Psychiatry*, 111, 348–56.

VOGLER, R. E., LUNDE, S. E., JOHNSON, G. R. & MARTIN, P. L. (1970) Electrical aversion conditioning with chronic alcoholics. *Journal of Consulting and Clinical Psychology*, 34, 302–7.

J. H. Glover, M.A., D.C.P., A.B.P.S.,

P. A. McCue, B.Sc., M.Psychol.,

Clinical Psychology Department, Stratheden Hospital, Cupar, Fife

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