

Subjective and Penile Plethysmography Responses to Aversion Therapy for Homosexuality: A Partial Replication

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Forty patients were randomly assigned to receive apomorphine aversion or avoidance conditioning to reduce homosexual impulses. Prior to and following treatment, they were shown a film containing pictures of nude women preceded by pictures of a red circle and of nude men preceded by a green triangle. At 2 weeks following treatment, the patients showed significantly less penile volume increase to the pictures of men and penile volume decrease to the pictures of women, but no penile volume increase to the pictures of women. The changes in penile volume response of each patient correlated with the reduction in homosexual feeling he reported at follow-up 6 months later. There was no weakening of the change in penile volume responses at this time. Some statistically significant relationships were found between various measures of each patient's response to treatment and conditionability, but these were not present both at 2 weeks following treatment and at subsequent follow-up. Also, they differed from the relationships which were found to be statistically significant in an earlier study. It was concluded that they were chance relationships. Approximately half the patients reported possible or definite reduction in homosexual feeling and an increase in heterosexual feeling after 6 months or longer. The results are comparable with those of a previous study using apomorphine conditioning and aversion-relief therapy to treat homosexuality.

INTRODUCTION

In a previous study (McConaghy, 1969, 1970a), 40 patients who requested treatment to reduce homosexual impulses were randomly assigned to receive

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apomorphine² or aversion-relief therapy.³ Response at 2 weeks and 1 year following treatment were assessed both by the patients' reports of change in subjective awareness of sexual feeling and overt behavior and by changes in penile volume in response to pictures of nude men and women. These indicated that homosexual drive was reduced following treatment. Evidence of increased heterosexual feeling was less consistent. There was no significant difference between the results of the two treatments.

Freund (1960) treated 67 homosexual male patients with an emetic aversion therapy, somewhat similar to that employed in the McConaghy study. Mac Culloch and Feldman (1967) treated 41 male and two female patients with an anticipatory avoidance⁴ learning procedure using an electric shock as an aversive stimulus. This technique was followed by a much greater reduction in homosexual feelings than were those of Freund and McConaghy. It was considered worthwhile to compare the apomorphine technique with anticipatory avoidance in a further study. This further study promised also to determine whether the findings of McConaghy's first study in regard to the changes following apomorphine aversion could be replicated.

METHOD

Forty male homosexual patients referred for aversion therapy were randomly assigned to four groups—immediate apomorphine therapy, delayed apomorphine therapy, therapy by means of immediate anticipatory avoidance learning, and delayed therapy by means of anticipatory avoidance learning. The method of determining the sexual orientation of male patients by measuring penile volume changes while they view films of male and female nudes has been reported elsewhere (McConaghy, 1967). The sexual orientation of the subjects having immediate treatment in the present study was assessed by this method prior to their commencing treatment and again 3 weeks later. The orientation of those whose treatment was delayed was assessed at these times and additionally 3 weeks prior to their commencing treatment. They were informed that they would need to attend for two assessments, prior to treatment. Changes in the

² Apomorphine treatment: A drug which induces nausea (apomorphine) is given to a subject. Shortly before the onset of nausea, a homosexual stimulus (e.g., slide of a nude male) is shown. The subject continues to view the slide as the feeling of nausea heightens.

³ Aversion-relief therapy: A slide depicting a homosexual stimulus is shown. This is followed by a noxious stimulus (e.g., shock). The sequence is repeated several times. A slide depicting a heterosexual stimulus is then shown. No noxious stimulus follows this latter slide.

⁴ Anticipatory avoidance learning: A slide depicting a homosexual stimulus is presented followed in a few seconds by a noxious stimulus (shock) and serves as a signal that the shock is about to be delivered. The subject may perform some behavior which will terminate the homosexual stimulus and prevent delivery of the shock.

immediately treated group before and after treatment could therefore be compared with changes occurring over the same period of time, without treatment, in the delayed-treatment group.

The patients were requested to return 6 months following treatment for a further assessment.

Details of Treatment

Patients were hospitalized for 5 days. After watching the sexual assessment film, they were shown 60 slides of nude or partially clothed male children, adolescents, or adults, some with penile erections. For patients having avoidance learning, these were followed by 30 slides of nude or partially clothed young adult women. Each slide was shown for 10 sec. While viewing the slides, all patients scored their sexual response to each slide as marked, moderate, slight, or none. At the same time, their penile volume response was recorded.

With apomorphine aversion therapy, 11-15 slides were selected to which the patients reported the greatest subjective response and showed the greatest penile volume response. Fifteen were selected if the patient both reported a marked response to this number and showed a clear penile volume increase to them. If both these responses were shown to less than 15 slides, only those to which these occurred were used. This was never less than 11. Generally, there was a strong correlation between these two responses. Apart from this method of slide selection, the apomorphine treatment was carried out as described previously (McConaghy, 1969). In brief, during the week of hospitalization each patient received 28 injections of apomorphine, after each of which he viewed one of the male slides while experiencing the resultant nausea.

The anticipatory avoidance learning study was based on the method described by Feldman and MacCulloch (1965). The patient viewed the slide of a male, which he was instructed to leave on as long as he found it attractive. After 8 sec, he commenced to receive an electric shock if he had not removed the slide by means of a hand switch with which he was provided. The shock continued until he removed the slide. Initially, he could avoid the shock by removing the slide within 8 sec; that is, slide removal was reinforced by the termination or avoidance of the shock. Once he had avoided the shock three times in succession, he was placed on a schedule of reinforcement. With this schedule, one-third of his attempts to remove the slide were immediately successful, one-third were successful only after a variable delay within 8 sec and one-third were not reinforced (that is, the patient could not remove the slide until after 8 sec had elapsed and he had received a shock). The slide of the male used initially was one the patient found only mildly attractive. When the patient was regularly attempting to remove it within a few seconds and stated that he no longer felt any response to it, it was replaced by one he found more attractive.

On some occasions following the removal of the male slide and termination of the shock, a slide of a woman was shown. The slide of the woman used initially was the one the patient found most attractive, and it was replaced by the one he found next most attractive when the male slide was changed. The schedule of reinforcement used by Feldman and MacCulloch (1965) was adhered to, and 30 presentations of a male slide were given per session.

Two sessions of treatment were given on the first day and three on each of the 4 subsequent days. A Grass S4 stimulator was used to deliver shocks of 1 msec pulses at the rate of 100 pulses per second through solder electrodes 5/8 inch in diameter coated with electrode jelly and attached to the tips of two fingers with adhesive tape. The intensity of shock used initially was that considered by the patient to be very unpleasant. If after commencing to receive the shock the patient did not immediately terminate it by removing the male slide, it was increased until he did so. The level of shock was further increased and decreased throughout the treatment according to the schedule of reinforcement. The range of minimum voltages employed was 30-90 v and the maximum 95-150 v.

Two patients decided not to continue with avoidance learning, one during the first session and one after 3 days, and one patient terminated apomorphine therapy after 2 days. They were replaced by other subjects. There were no significant complications of treatment. One patient did not return for assessment at 2 weeks following treatment. Twenty-four of the 40 patients attended for assessment 6-7 months following treatment, six more attended at 8, two at 10, and one at 13 months. One was out of state and one overseas, but they wrote reporting their responses. Two telephoned and stated that they had responded to treatment completely but would not keep appointments for assessment. Three did not answer repeated communications.

The Patient Group

All persons conscious of homosexual feeling who wished to have this feeling reduced or eliminated, and who were not overtly psychotic, were accepted for treatment. The majority of patients were referred by other psychiatrists. Their ages ranged from 18 to 53 years, with a median of 25 years. Seven were married. Thirteen had been arrested by the police for homosexual behavior, nine on more than one occasion. Legal action had led to eight of the 13 coming for treatment, though all claimed they wanted treatment in any case. Five of the married men were having regular sexual intercourses with their wives, but four of the five had been arrested by the police more than once for homosexual behavior. The sixth married man was having intercourse with his wife only a few times a year, and the seventh had ceased a year before treatment. Of the unmarried men, 15 had experienced heterosexual intercourse and two more had attempted it. In all but two, such experience had not occurred within the year prior to treatment.

Twenty-one patients were having regular homosexual relations until treatment commenced, and another 12 had had such relations within the previous 6 months. Three patients had never had homosexual relations and a further four not for several years. These patients were all distressed by the intensity of their emotional attraction to males.

RESULTS

Penile Volume Responses Following Therapy

In each film assessment of sexual orientation, ten photographs of women and ten of men were shown to the subjects. It was found previously (Mc Conaghy, 1970a) that the most reliable measure of the resultant penile volume changes was that obtained by testing the difference between the ten volume responses to the pictures of the men and the ten to the women, using the Mann-Whitney U test (Seigel, 1956). To use this test, the two sets of volume responses to ten stimuli are combined and ranked in order of decreasing size. (Where the means of the responses to both the males and females are negative, the sign of the response is reversed). The value of U (the statistic used in this test) is obtained by summing the number of responses to the female nudes which exceed in magnitude responses to the male nudes during exposure to the stimuli. This provides a U score for each subject assessment which approaches 100 the more the responses to the females are greater than those to the males and approaches 0 the more the responses to the males are greater. That is to say, U scores of more than 50 indicate a heterosexual orientation and less than 50 a homosexual orientation.⁵

In the present study, for the 20 patients who viewed the film twice prior to treatment, the correlation between the U scores of each patient on the two occasions was $\rho = 0.65$ (Spearman's rank order correlation). Compared with the lack of significant change in U score without treatment (i.e., in the delayed-treatment group), at 2 weeks following treatment the U scores of the 39 subjects who attended for assessment changed to a significant degree in the heterosexual direction; that is, the subjects showed significantly less penile volume change to the pictures of men as compared with that to pictures of women ($p < 0.05$, Wilcoxin test). There was no significant difference between the responses of those who were viewing the film for a second time (the immediate treatment group) and those who were viewing it for a third time (the delayed-treatment group). For the latter group, who viewed the film twice prior to treatment, the correlation between the summed penile volume responses of each patient to the

⁵ To understand this technique of obtaining a U score in more detail, it is necessary to consult the reference given (Seigel, 1956) where it is dealt with at some length.

pictures of the men on the two occasions was $\rho = 0.64$ and to the pictures of the women $\rho = 0.39$. There was no significant change in these summed responses over 3 weeks without treatment. Following treatment, the summed penile volume responses of each of the 39 patients to the pictures of the men were significantly reduced ($p < 0.05$, Wilcoxin test) compared with their responses prior to treatment; those to the pictures of women were not significantly changed.

The U scores for the film assessment of the patients who attended for follow-up 6 months or more following treatment did not differ significantly from the U scores for the assessment at 2 weeks following treatment, but did differ significantly from those of the pretreatment assessment ($p < 0.01$, Wilcoxin test). There were no significant differences between the responses of those patients who were viewing the film for a third time and those who were viewing it for a fourth time.

Table I. Reported Subjective Responses at 2 Weeks and 6 Months Following Aversion Therapy

	Avoidance learning		Apomorphine aversion therapy	
	2 weeks	6 months	2 weeks	6 months
Heterosexual			Heterosexual	
Desire			Desire	
Increased	8	1	Increased	3
Possibly increased	2	8	Possibly increased	6
Unchanged	8	5	Unchanged	10
Possibly reduced	1	1	Possibly reduced	0
Reduced	0	0	Reduced	1
Unknown	1	5	Unknown	0
Relations since treatment			Relations since treatment	
Increased	3	2	Increased	2
Unchanged	1	2	Unchanged	2
None	15	11	None	16
Unknown	1	5	Unknown	0
Homosexual			Homosexual	
Desire			Desire	
Increased	1	0	Increased	1
Possibly increased	0	2	Possibly increased	0
Unchanged	2	5	Unchanged	5
Possibly reduced	4	2	Possibly reduced	4
Reduced	11	6	Reduced	9
None	1	0	None	1
Unknown	1	5	Unknown	0
Relations since treatment			Relations since treatment	
Increased	0	2	Increased	0
Unchanged	5	4	Unchanged	1
Reduced	0	4	Reduced	2
None, reduced	12	4	None, reduced	12
None, unchanged	2	1	None, unchanged	5
Unknown	1	5	Unknown	0

Reported Subjective Response to Therapy

Table I summarizes the feelings and behavior reported at 2 weeks following treatment by the 39 subjects who attended for assessment and after 6 months by the 33 patients who attended and the two subjects who reported by letter. The estimate of change in heterosexual and homosexual desires was based on the patient's awareness of the amount of sexual interest in men and women and the amount and nature of sexual fantasy, including masturbatory fantasy.

Relationship Between Penile Volume and Subjective Response Following Treatment

As a measure of change with treatment, the U score for penile volume assessment prior to treatment was subtracted from the U score at follow-up for each subject. Those subjects who at follow-up reported possibly or definitely reduced or absent homosexual desire showed a significantly greater change in U score in the heterosexual direction than did those whose homosexual desire was unchanged or increased ($p < 0.05$, Mann-Whitney test). The subjects who reported increased or possibly increased heterosexual desire showed a greater but not statistically significant change in U score in the heterosexual direction than did those who reported that their heterosexual desire was unchanged or possibly reduced.

Relationship Between Response to Aversion Treatment and Conditionability

In the film used in the assessment procedure, the pictures of nude women were preceded by a red circle, those of the men by a green triangle. It has been shown that conditioned penile volume responses tended to occur to these symbols similar to the responses which occurred to the following nudes (Mc Conaghy, 1970*b*). The relationship between each patient's ability to set up conditioned responses in this procedure and his degree of response to aversion therapy was examined. A number of patients showed atypical conditioned responses; i.e., they showed negative conditioned responses when the unconditioned responses were positive or *vice versa*. It was decided that the responses of this group of patients should be looked at separately.

In the initial assessment, 33 subjects showed mean positive responses to the pictures of male nudes. Of these, 22 showed mean positive responses to the green triangles preceding these pictures—these were positive conditioned responses. The positive conditioned responses of these subjects were ranked in order of magnitude and divided at the median. Their reported clinical response at 2 weeks following treatment was divided as near to the median as possible. There was a significant trend for the subjects who showed greater conditioned responses to report loss of or definitely reduced homosexual feeling ($p = 0.05$,

exact test). There was no trend for these subjects to report an increase in heterosexual feeling, as compared with the group showing poorer conditioning.

At follow-up, there was no longer any trend for the subjects who showed greater positive conditioned responses at the initial assessment to show a better response to treatment, in either reduction of homosexual feeling or increase of heterosexual feeling. An initial assessment, two subjects showed mean negative responses to the pictures of the males and the preceding green triangles; five showed mean negative responses to the males and mean positive responses to the preceding triangles and nine the reverse. These subjects' reported response at 2 weeks following treatment and at follow-up was not worse than that of the group showing positive conditioning.

Seventeen subjects showed mean negative responses to the pictures of the female nudes. Of these, 12 showed mean negative responses to the preceding red circle. Dividing these negative conditioned responses at the median as above, there was no relationship between magnitude of conditioned responses and change in heterosexual or homosexual feeling at 2 weeks following treatment or at later follow-up. There was no consistent trend for the subjects who showed mean responses to the red circles, which were in the opposite direction to the following unconditioned responses, to report less response to treatment.

There was no relationship between the patients' ability to set up conditioned responses to the figures preceding the male or the female nudes and their response to treatment as measured by change in *U* score of the sexual orientation assessment, either at 2 weeks following treatment or at follow-up.

DISCUSSION

Measures of Response

In both the present and the initial study (McConaghy, 1970a), a significant relationship was found between the decrease in homosexual feeling reported by the patient at follow-up and the reduction in penile volume increases to pictures of males compared to females. This was true for 72% of the cases. As the changes in penile volume measured do not appear to be under conscious control, this strongly suggests that both procedures are valid measures of response to treatment. Most subjects are unaware of the nature of the penile volume changes, which are generally far less than full erections.⁶

In the initial study, following treatment there was a significant reduction in mean penile volume response of the patients to pictures of men and an increase to pictures of women. The increase to the pictures of women was looked at

⁶ Penile volume change is not measurable absolutely with the technique employed here. It was considered that relative measures of change would suffice.

separately for those patients who prior to treatment showed a negative mean penile volume response to pictures of women and those who showed a positive response. The change following treatment was statistically significant only in the former group, though the latter showed a strong trend in this direction. In the present study, following treatment there was again a significant reduction in mean penile volume in response to pictures of men. Only those patients who prior to treatment showed a mean negative response to pictures of women showed a statistically significant increase in response to such pictures following treatment. There was actually a decrease in response to pictures of women in those patients who prior to treatment showed a mean positive response to such pictures.

From these data, it would seem that there is a decrease in reported homosexual feelings and in associated negative heterosexual feelings following aversion treatment, but there is no actual increase in heterosexual feelings. Though following treatment the *U* scores for the sexual assessment of the patients taken as a whole changed significantly in the heterosexual direction, those of ten patients shifted in the homosexual direction. A similar finding was reported in the initial study. In that study, all patients who showed this paradoxical shift in the homosexual direction had pretreatment *U* scores of over 40. In the present study, there was a strong trend in the same direction, but it was not invariable.

The increase in heterosexual feeling reported by some patients may be due to a greater awareness of such feeling when homosexual feeling is reduced. This explanation is supported by the fact that in both studies there was a trend for those patients who reported reduced homosexual feelings at follow-up also to report increased heterosexual feelings. In the initial study, the trend was not statistically significant, but in the second it was ($p = 0.05$, exact test). In neither study did the patients who reported increased heterosexual feelings show increased mean penile volume response to the pictures of women following treatment or at follow-up, compared with the group who reported no increase in heterosexual feeling. This remained true when this relationship was examined only in those patients who showed mean negative penile volume responses to the pictures of women prior to treatment.

Comparing the results of the two studies at 2 weeks following treatment, considerably more patients in the present study reported a possible or definite increase in heterosexual feeling and a possible or definite decrease in homosexual feeling. At the 6 month follow-up, there was little difference between the numbers of patients reporting such changes in both studies. This suggests that the reports of patients at 2 weeks following treatment may be less valid than those at 6 months, possibly because they have had insufficient time to assess the change in their feelings accurately and so are more suggestible. In both studies, there was a significant relationship between the change in penile volume re-

sponses and reported homosexual feeling at 6 months but not at 2 weeks following treatment. This also suggests that patients' reports of sexual feeling at 2 weeks following treatment are not maintained over the long term.

Comparison of Treatments

There seemed little difference between the efficacy of apomorphine and avoidance learning as used in this study. At 2 weeks following treatment, slightly more patients reported increased heterosexual and decreased homosexual feelings with avoidance learning, but at 6 months this trend was no longer present. As regards reported behavior, the results slightly favored apomorphine therapy. The changes in the heterosexual direction in penile volume response to pictures of women *vs.* men following treatment occurred to a statistically significant extent only with apomorphine and not with avoidance conditioning. However, it may be that when the *U* score for these responses prior to treatment is over 40, the result is not valid. When these scores are omitted, there was no difference in the changes with the two treatments.

Relationship of Response to Conditionability

As in the initial study, there was no consistent relationship between the magnitude of the patients' positive and negative conditioned responses in the initial film assessment and their reported response to treatment. In both studies, there was no relationship between the magnitude of these conditioned responses and the change in penile volume response to pictures of men and women in the film assessment which followed treatment. This suggests that there is no general factor of conditionability or that the aversion therapies do not act by establishing conditioned responses, assuming that speed and magnitude are valid measures of the establishment of such responses.

Relationship of Response to Other Factors

MacCulloch and Feldman (1967) reported that patients with a pretreatment Kinsey rating (Kinsey *et al.*, 1948) of 3, 4, or 5 tended to improve more with treatment than did those with a rating of 6. In the present study, as regards reported weakening of homosexual feeling, those rated as 4 responded better than those rated as 5 or 6; as regards failure to resume homosexual behavior, those rated as 4 responded better than those rated as 5, who responded better than those rated as 6. As regards reported strengthening of heterosexual desire and the establishing of heterosexual relations, there was a less consistent trend for those patients with lower Kinsey scores to respond better. However, again as MacCulloch and Feldman reported, those patients who had had previous hetero-

sexual relations were much more likely to establish or maintain such relations following treatment than those who had not had such experience.

MacCulloch and Feldman found that patients under 30 years of age responded better than those over 30. This was true in the present study for one measure only—cessation of homosexual activity. At the same time, more patients over 30 reduced the frequency of their homosexual behavior, which often resulted in their being able to avoid situations such as making encounters in public lavatories, so reducing their liability to legal prosecution.

There was no consistent relationship between the intensity of voltage accepted by the patients with avoidance therapy and their response. In no case, however, were levels of shock used which caused the patients marked emotional distress.

Comparison with Other Studies

In the initial study, apomorphine therapy was compared with aversion-relief. The results of these treatments of homosexuality were compared with those of Freund (1960), who treated 67 male patients with apomorphine therapy, and of MacCulloch and Feldman (1967), who treated 43 patients with avoidance learning. It was concluded that at least in terms of loss of homosexual feelings and interest the results of MacCulloch and Feldman were markedly superior to those of the initial study and that of Freund. The failure of avoidance learning to prove superior to apomorphine in the present study is therefore disappointing.

The avoidance technique used in this study was derived from that described by Feldman and MacCulloch (1965). The level of shock used was determined by the same method but of course may have been less unpleasant. Another variable which might be of significance is the number of sessions of treatment and their frequency. Feldman and MacCulloch (1965) used two sessions of treatment a day, the number varying from 5 to 28, with the average being about 15. About 30 trials (stimulus presentations) were given per session. They stated that treatment was continued until either a change of interest occurred or it became clear that no change was likely. In a pilot study (McConaghy) of avoidance conditioning, no such clear-cut change occurred—the patient reported some degree of change during treatment but found it impossible to be sure of the amount. It was decided to investigate the effect of 14 treatment sessions administered over a week. Thirty trials were given per session. This approximated the average number of treatment sessions used by MacCulloch and Feldman up to that time, when they had treated 19 patients. In their final report (1967) of the treatment of these 19 and an additional 24 patients, each patient had received an average of 18-20 sessions, with about 24 trials per session. Hence the patients treated in the present study received approximately the same

number of trials but in more frequent and fewer sessions. A third variable was that Feldman and MacCulloch (1965) gave "booster" sessions to their patients, particularly in the first few months after treatment. However, Feldman (1969) stated that not more than three or four patients had booster sessions.

Though the differences in technique may be entirely responsible for the markedly superior results of MacCulloch and Feldman, this seems unlikely. In the present as in the previous study and in that of Freund, all patients at follow-up reported some degree of homosexual feeling. Fourteen of MacCulloch and Feldman's patients reported no homosexual feeling at follow-up. Some of the patients in the present study may have received too few sessions of treatment, but several should have received an adequate number in view of the fact that some of MacCulloch and Feldman's patients responded after as few as five sessions. It would therefore be expected that at least some patients in the present study would have reported no homosexual feeling following avoidance learning.

Comparing the results of the initial study with those of the present study, there was little difference between the change in reported sexual behavior following treatment, either at 2 weeks or at follow-up. The change in sexual feelings reported at 2 weeks varied considerably between the two studies but not those reported at follow-up. This suggests, as would seem likely in view of the fact that feelings fluctuate more than behavior, that in most circumstances reported behavior would be a more valid index of change than reported feelings. At follow-up in the initial study, 14 patients had heterosexual intercourse subsequent to treatment, in the present study 12, and in MacCulloch and Feldman's 13. In the initial study, 24 patients had homosexual relations subsequent to treatment and in the present study 19. Fourteen of MacCulloch and Feldman's patients were having homosexual relations at the time of follow-up. It is not clear whether more had had such relations over the entire period following treatment. In terms of change in actual behavior, there would seem little difference in the results of these studies. It could be that patients in the present and initial studies reported more objectively about their sexual feelings at follow-up as they considered that these were being measured by penile plethysmography.

A disturbing finding of the present and initial studies is that three widely different conditioning treatment techniques have been compared and the results have been similar. Aversion-relief treatment employed written phrases descriptive of homosexual activity as the conditional stimulus and electric shocks as the unconditioned stimulus. Each patient received over 1000 pairings of these stimuli during the week of treatment. With avoidance conditioning, each patient was presented 420 times with the slides of males associated with the threat of shock and received a shock on at least a third of these occasions. With apomorphine therapy, there were 28 presentations of male slides followed by nausea. Special care was taken to select slides of men which were sexually arousing to

the patients who received avoidance conditioning and apomorphine aversion in the present study. The elaborate technique of avoidance learning was designed by Feldman and MacCulloch (1965) on the basis of experiments on animal and human learning in the literature, with the expectation that it would prove a much more effective therapy.

It was pointed out previously (McConaghy, 1969) that it cannot be assumed that the aversion therapies act simply as conditioning techniques. Hence the most efficient conditioning technique may not prove the most efficient aversion therapy. However, it is strange that techniques so widely different as those used in these two studies should have produced similar results. It would seem that the treatments do produce changes in sexual feelings, in view of the objective changes in penile volume response in the heterosexual direction which are present 3 weeks following treatment and which do not occur without treatment. However, these changes could be due to the effect of suggestion. Feldman (1969) stated that, in a controlled study to be published, avoidance conditioning produced significantly better results than psychotherapy for homosexuality. This again does not prove that avoidance conditioning produced its effect specifically. Therapy associated with electrical shocks may produce greater suggestibility than that without shocks.

Until it can be determined that there are specific features which are necessary for aversion therapies of homosexuality to be effective, it is impossible to design the ideal experiment comparing therapies which one can be confident have equal suggestibility value, but one of which incorporates the specific features and the other does not. To determine whether such specific features exist, it would seem necessary to carry out further studies, similar to the initial and present studies, investigating the effect of administering the aversive stimuli in different temporal relationships than the stimuli evoking homosexual feelings, with the expectations that some patterns will prove therapeutically less effective.

If the aversion therapies used in the initial and present studies are in fact acting specifically to produce equal degrees of response in spite of the wide differences among them, this suggests that they can produce a certain degree of change but that, once it occurs, any further treatment of this type will be ineffectual. This is compatible with the results of booster treatment. In the initial study, four patients received a further week of aversion therapy within a few months of the first course and a further three after follow-up at 1 year. In the present study, seven patients received a further week of treatment after follow-up at 6 months. This additional therapy produced no significant change in the penile volume responses to the assessment film 2 weeks following this additional treatment. At follow-up 6 months later, three of the 14 patients reported reduction of homosexual feeling following the additional treatment, but one of these failed to attend for follow-up assessment, and in no case was there further improvement in sexual behavior.

It is realized that the treatments used in these studies are far from the ideal

form of behavior therapy which one would utilize to treat homosexuality given the necessary knowledge and facilities. MacCulloch and Feldman (1967) considered that it was valuable to follow aversion treatment with supportive and directive interviews encouraging the patients to form new social skills in the heterosexual area, and this was done in the present and the initial studies. They pointed out that a more systematic approach may prove more valuable. With this expectation, some of the author's patients have been treated after the first period of follow-up with systematic desensitization against fears of heterosexual situations, but so far the results have been disappointing. Certainly, in addition to research aimed at improving the efficacy of aversion therapy, the problems of increasing heterosexual drive and behavior warrant investigation, in order that the ideal regime may ultimately be designed.

ACKNOWLEDGMENTS

Professor L. G. Kiloh, Head, School of Psychiatry, University of New South Wales, is thanked for his assistance. The National Health and Medical Research Council of Australia provided a grant for the salary of a research assistant, Mr. D. Colette, permitting this study to be carried out.

REFERENCES

- Feldman, M. P. (1969). Personal communication.
- Feldman, M. P., and MacCulloch, M. J. (1965). The application of anticipatory avoidance learning to the treatment of homosexuality. I. Theory, technique and preliminary results. *Behav. Res. Therap.* 2: 165-183.
- Freund, K. (1960). Some problems in the treatment of homosexuality. In Eysenck, H. J. (ed.), *Behaviour Therapy and the Neuroses*, Pergamon Press, Oxford.
- Kinsey, A. C., Pomeroy, W. B., and Martin, C. E. (1948). *Sexual Behaviour in the Human Male*, Saunders, Philadelphia.
- MacCulloch, H. J., and Feldman, M. P. (1967). Aversion therapy in management of 43 homosexuals. *Brit. Med. J.* 1: 594-597.
- McConaghy, N. (1967). Penile volume change to moving pictures of male and female nudes in heterosexual and homosexual males. *Behav. Res. Therap.* 5: 43-48.
- McConaghy, N. (1969). Subjective and penile plethysmograph responses following aversion-relief and apomorphine therapy for homosexual impulses. *Brit. J. Psychiat.* 115: 723-730.
- McConaghy, N. (1970a). Subjective and penile plethysmograph responses to aversion therapy for homosexuality: A follow-up study. *Brit. J. Psychiat.* 117: 555-560.
- McConaghy, N. (1970b). Penile response conditioning and its relationship to aversion therapy in homosexuals. *Behav. Therap.* 1: 213-221.
- Siegel, S. (1956). *Non-parametric Statistics for the Behavioural Sciences*, McGraw-Hill, New York.