
Stress and Alcoholism

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SELYE (1956) DEFINED stress as the nonspecific response of the body to any demand made on it. Included in these demands were the normal physiological responses one would expect from walking into the cold from a warm house or engaging in an exhilarating activity. Over the years people came to use the word "stress" in a negative fashion, encompassing all the aversive events that may affect an organism. In response to this, Selye coined the term "eustress" to encompass the "positive" stresses.

Selye's original experiments were done on rats. When he injected the rats with cattle-ovary extract, they showed the following symptoms: (1) enlargement of the adrenal glands, (2) decrease in the size of the thymus and other bodily defense systems, and (3) deep bleeding ulcers of the stomach and duodenal linings.

Selye found that upon exposure to stimuli, animals underwent three distinct stages. The *alarm reaction*, a generalized "call to arms" of the defensive forces of the organism, was the first. If the animal did not die from initial exposure, it necessarily moved to the second stage, the *stage of resistance*. Physiological reactions during the resistance stage were almost the opposite of the alarm reaction. Whereas during the alarm reaction there was considerable discharge of glandular secretions, the stage of resistance showed a buildup of glandular

secretions. If exposure to the noxious stimuli continued, the *stage of exhaustion*, which was quite similar to the alarm reaction, was reached. The end result was death, but a death due to premature aging from wear and tear. Selye called this three-stage response sequence the General Adaptation Syndrome (GAS).

In describing the three-stage model, Selye called it adaptive because defenses were stimulated in order to maintain the homeostatic balance within the body. Homeostasis refers to bodily systemic balance or consistency. It is this second stage of the GAS that we will largely be concerned with how people resist noxious stimuli in order to maintain homeostasis.

The Effects of Stress on Human Beings

We differentiate between two types of stress: acute and chronic. Acute stress occurs when danger arises. The stress is immediate and must be responded to instantaneously. Frequently people report being very clear in their thoughts during this phase. The body is in danger and must respond correctly and quickly. Chronic stress is prolonged and unabated (Pelletier, 1977), and can result in severe hypertension due to kidney damage.

No organ is immune to the stress response. Either through genetics or selective conditioning, it may affect one specific area in a particular individual—say, the kidney—but it is only a matter of time before the whole body is involved. Since stress causes a weakening of the immunological response, stress-ridden people are more sickly than those who are relatively free of stress, and the ultimate effect is death.

Adaptive work is whatever process of change the body goes through in order to adjust to the stress stimulus in stage 2 of the GAS. Selye devised the construct "adaptation energy" for the process experienced in adaptive work. He considered the amount available to any one being to be finite. When this is used up, death soon results, as the body is no longer able to maintain homeostasis in the presence of noxious stimuli. In Selye's opinion, no one dies from old age. If old age was indeed a cause of death, one would expect all the body's organs to wear out at the same time. This does not happen. Without adaptive energy, individual organs (the heart, lungs, and so on) cannot survive the environment's demands.

Individual Differences in Reactions to Stress

Stress does not produce negative physiological responses until the stimulus affects the psychological state of the beholder and is perceived

as stressful (Pelletier, 1977). People react differentially to certain specific stimuli, phobias being an obvious example. Some people are petrified of snakes, yet others keep them as house pets. What factors cause people to experience stressful stimuli differently?

Perceived Control. The objective magnitude of a crisis of work or living situation is not as significant as the extent to which the individual perceives the situation to be threatening and therefore stressful. The amount of control the individual has over a stressful situation has a significant impact on his or her response. Overcrowding does not seem to be a factor in stress until people feel a loss of control (Tanner, 1976). Studies done on reduction in electrothermal response when the subject is able to control the aversive stimuli show significant reductions in measured levels of stress as compared to situations without control (Haggard, 1946; Champion, 1950; Corah and Boffa, 1970). However, it is not only actual control that reduces stress; perceived control will also result in lower levels of stress (Stotland and Blumenthal, 1964; Corah and Boffa, 1970; Glass and Singer, 1972). For Glass and Singer, this was true also on their measures of social and physical stressors: discrimination and bureaucracy. As long as the perception of control exists, whether justified or not, stress is reduced.

One way the perception of control can be maintained is through adaptation, either by changing the organism or by having the organism change the environment. Of the population in general, those who have difficulty in adapting to challenging situations, however mundane, are those who exhibit a major proportion of the illnesses (Pelletier, 1977). Put another way, that organism which is most adaptable is that organism which will survive (Bandler and Grinder, 1979).

Occupational Effects. A frequent topic of newspaper articles, television specials, and research studies is the relatively high rate of alcoholism among certain occupational groups. Three groups come to mind as examples: air traffic controllers, physicians, and police officers. Air traffic controllers, when compared to commercial cargo pilots, were found to have significantly greater incidences of high blood pressure, diabetes, and peptic ulcers (Tanner, 1976). Pearson (1975) reported that there is increasing evidence of emotional disturbance among physicians, and one effect associated with the stress physicians experience has been an increase in alcoholism. Nordlicht (1979) notes that stress factors among police officers are primarily due to the demands of the department, the community, and family life. The stresses that police officers experience include rejection due to their occupation, limited exposure to a wider world, disruptive work schedules, inability to give attention and love to their children, and a shortage of communication

with their spouses. Nordlicht concluded that the most serious result of these stresses is alcoholism.

Another factor currently receiving publicity is the effect of post-Vietnam trauma. Lacoursier, Godfrey, and Ruby (1980) discuss how the stress trauma of Vietnam combat, among other things, has caused some veterans to "self-medicate" themselves with alcohol to the point of abuse.

There does seem to be a correlation between high-stress jobs and alcoholism, but one important point remains. Despite increased rates of alcoholism among certain occupational groups, the majority of people in these groups do not become alcoholics. If each subgroup was exposed to approximately the same levels of stress, why did some people turn to alcohol when others did not? How do the alcoholic subjects differ from the nonalcoholic subjects?

Alcoholics' and Nonalcoholics' Reactions to Stress. There is evidence of stress-related differences between alcoholics and nonalcoholics. Litz (1979) reported that among a group of alcoholic and nonalcoholic women, the alcoholic group subjectively "felt" the impact of stress more than the nonalcoholic group. In another study of women, Eddy (1978) had similar findings: Alcoholic women had greater levels of trait anxiety than nonalcoholic women on the State-Trait Anxiety Inventory. Horn (1978) matched groups of twenty male alcoholics and twenty male nonalcoholics and measured them on self-report and behavioral tests of assertive behavior. Although there were no differences in assertive behavior, alcoholics reported more assertive discomfort on both tests.

Thus it appears that given approximately equal amounts of stress, the alcoholic reports more perceived stress. Each situation is more stressful for the alcoholic subject than the nonalcoholic subject.

Interpersonal Failure as a Stressor. A second difference perhaps explains and expands upon the first. Forrest (1978) suggests that interpersonal failure is the basic rationale for alcoholic and problem drinking. Failure, he writes, "may be the single most important behavioral issue in the developmental pathology of alcohol addiction." Forrest characterizes interpersonal failure as a life-style where there is a very significant lack of interpersonal skills. His assumption is that a large part of the alcoholic population was not wanted, was raised by grandparents, foster parents, or other surrogates. The result was a poor self-concept and a general feeling of not being wanted, inadequacy, and inferiority. Forrest (1983; 1984) also cites the same general process among children in affluent, intellectual, seemingly well-adjusted families. Interpersonal relations may, on the surface, appear good, but

in reality these relations are a composite of double messages and distorted communications. This failure identity promotes continued life failures, although the opposite effect can certainly be seen. The "successful" hard-driving business person who takes on a counter-identity in a continual struggle to prove his or her ability and worth is a prime example. At the core of the struggle is the failure identity, and poor interpersonal and coping skills.

There are data to support this premise. Allman, Taylor, and Nathan (1972) studied a group of three chronic alcoholics and exposed them to stress and a social situation. They found that subjects drank most when stress and social interaction coincided. While the study suffered from small sample, it does link stress, social interaction, and drinking behavior. Parker, Gilbert, and Thoreson (1978) note that there appear to be social-skill deficits in alcoholics versus nonalcoholics.

Interpersonal failure, then, can be a potent stressor. Certainly everyday living requires socialization with spouse, children, and co-workers, yet each interaction involves some stress. For an individual with poor interpersonal and coping skills, every interaction becomes a stressor, the anticipation of an interaction is a stressor, and remembering the interaction is a stressor. If almost every interaction places a person under stress, it is easy to see that this person must adapt more often than someone who does not find social situations so difficult. Alcoholics seem to respond to many social situations by being stressed. They also drink in order to extinguish this socially defined stress.

Is there a common factor that holds together this differential perception of stress and interpersonal failure? As we have previously mentioned, stress does not have an effect unless there is perceived lack of control. When there is perceived control, stress is less arousing (Glass and Singer, 1972). Since alcoholics seem to perceive more stress, it follows that they must also perceive less control or fewer alternatives for coping.

Are there group differences which would lead to this perception of less control? The difference seems to lie in the ability to use Selye's adaptive energy to develop alternative stress-reducing behaviors. Berman (1969) reported that drinking represents an exclusion of alternate, more adaptive behavior. Drinking does have adaptive consequences (Davis et al., 1974), but this behavior is only one response out of an infinite number of possibilities. This is in contrast to stress-resistant people, who tend to have common personality traits and coping styles. They are usually flexible in their attachments to other people, groups, and goals. They readily shift to other relationships when established ones are disrupted (Tanner, 1976). In other words, they are highly adaptive. Alcoholics rarely form other than superficial relationships and are stuck in their one overlearned behavior pattern, drinking.

Stress is differentially perceived. Each individual's reaction is related to a complex interaction of perceived control, actual control, learned coping skill, range of coping alternatives, and an attitudinal component of openness and flexibility.

Social Learning and Alcoholism

The premise of this chapter is that alcoholism is a multidimensional syndrome with its basis in social learning. Although a genetic predisposition may be able to account for differential physiological reactions to alcohol, we still have to account for how people learn to use alcohol and continue using alcohol.

The majority of people in this country have parents who modeled various types of drinking behavior as well as a myriad of coping skills or lack thereof. We learn our strategies for coping with stress and tension from our parents or other caretakers. We learn to take a drink after work, withdraw, ask for support, play, meditate, pray, respond socially, or respond irrationally from these models.

Social learning explains that individuals are exposed to differentially effective models. Parent A may model the use of alcohol as a way of "unwinding" after work by having a drink or two. This same person may also be modeling good interpersonal skills with his or her spouse, reliable work habits, flexibility in problem solving, the regular use of exercise, and so on. On the other end of the continuum, Parent B may model having a few drinks after work, abusive behavior toward the spouse, periodically missing work because of hangovers, poor relationships with friends and family, and other ineffective behavior patterns.

These two examples have different types of coping behaviors. Depending on the effectiveness of these behaviors, the individual will experience varying degrees of stress reduction or even an increase in stress. At this point operant conditioning helps to explain the maintenance of the drinking behavior. Parent A models a variety of responses which have the potential to reduce stress and be reinforcing in terms of secondary gains (i.e., money to live on, recognition at work and home, reduced perceived level of tension). These reinforcers are more potent than they would be if the person only had alcohol consumption as an effective tension-reducing technique.

If alcohol consumption is the most effective behavior in the person's response repertoire for reducing tension, it will have greater potency as a reinforcer (Lawson, Peterson, and Lawson, 1983). Thus there is an interactive effect of the number of effective coping alternatives modeled and the relative reinforcing potential of the alcohol consump-

tion. Those individuals who use alcohol to reduce stress probably have had models with fewer coping alternatives.

Modeling is the predominant modality for learning most of our interpersonal and coping skills. Alcoholics have models on a variety of levels. The first aspect of modeling is the attitude of Western culture toward drinking: namely, that for one reason or another, almost every adult consumes varying quantities of alcohol. What party is without a certain amount of alcohol consumption? Edwards et al. (1972) surveyed 306 male adults who reported drinking at least once or twice a month. They reported that alcohol was used primarily for psychotropic effects, for its taste at meals, and in response to environmental pressures. Sadava, Thistle, and Forsythe (1978) studied 370 nonalcoholics, 51 percent of whom were women. They found, among other things, a positive attitude toward alcohol use. This positive attitude certainly implies some powerful modeling.

There are two frequently occurring models: peers and family. DeRicco (1978) found a direct effect of modeling on drinking rates. In this study, subjects drank with a pair of confederates. It was found that the subjects consistently matched the drinking rate of the confederates whether the confederates modeled a high or low consumption rate and regardless of the sex of either confederates or subjects. Familial modeling (Wegscheider, 1981) is perhaps even more powerful, if only because it is more longstanding. A review of studies conducted over four decades showed that on the average, one-third of any sample of alcoholics had at least one parent who was an alcoholic. In every study of families of alcoholics and nonalcoholics, the incidence of alcoholism was greater among families of alcoholics. One could argue for a genetic predisposition toward alcoholism, but this cannot account for all the data. Various cultures do show different drinking patterns. In different studies of rates of alcoholism among ethnic groups, the Irish-Americans show consistently greater rates than the population as a whole (Bales, 1946). Yet in terms of per capita consumption of alcohol, the Irish in Ireland rank rather low (Forrest, 1978).

In addition to specifically modeling drinking in families, alcoholic parents do not model many other coping responses. In a study of 186 adolescents, Rouse, Walker, and Ewing (1973) found significant differences on measures of psychological stress and activities used to relieve depression. Children of heavy drinkers indicated more stress but utilized fewer effective adaptive methods of dealing with anxiety and depression. In other words, these adolescents were already excluding appropriately adaptive responses to stress other than the drinking response, and they were limited in their repertoire of coping skills.

In addition to social learning and modeling effects, operant condi-

tioning can also partially account for the use of alcohol as a coping response. Operant conditioning holds that an event or behavior which is reinforced will tend to reoccur with greater frequency than others which are not reinforced. When perceived tension is eliminated through drinking, the operant (drinking) behavior is reinforced negatively. Various studies on alcohol and operant conditioning (Mello and Mendelson, 1965; Mendelson and Mello, 1966; Narrol, 1967; Nathan et al., 1970; Cohen, Liebson, and Faillace, 1971) have focused on changing contingencies for drinking behavior, thus showing that at least some alcoholic drinking can be regarded as an operant response and manipulated accordingly.

Our view of alcoholism, while not applicable to every client, suggests that problem drinkers and alcoholics drink, at least initially, to remove aversive stimuli. A person suffering from job tension, family tension, or some other disagreeable condition takes a drink and feels better. Because the person finds that alcohol consumption reduces the effects of an aversive stimulus, drinking is reinforced, with the expected increase in frequency.

Critics of the tension-reduction hypothesis, or TRH (Mendelson, 1964; McNamee, Mello, and Mendelson, 1968; Nathan and O'Brian, 1971), have pointed out that among chronic alcoholics, tension actually increased upon consumption of alcohol. While we do not question the results of these studies, consider the following points: (1) The TRH may work best at a prealcoholic level (Edwards et al., 1972); (2) among problem drinkers, drinking behavior is overlearned (Forrest, 1978); and (3) in later stages, consumption of alcohol itself may be considered a stressor, as the individual has probably experienced repeated negative consequences from his or her drinking and reacts to the drinking, at least on the cognitive level, as a stressor.

Thus an explanation for resolving the apparent conflicts in the TRH might be that this model best fits those individuals in a pre-chronic alcoholic stage of drinking. They are the ones for whom a drink probably reduces tension. This behavior becomes overlearned, that is, learned to the point of excluding other more adaptive, more appropriate behaviors. Additionally, at the point that drinking behavior affects the life of the drinker, be it at work or in social and familial situations, the consumption of alcohol itself, paradoxical as it may seem, may cause an increase in the drinker's level of anxiety. Also, those who point to the measured maladaptiveness of drinking behavior may be overlooking an important factor: the strength of a response that it is intermittently reinforced. If the overlearned response is intermittently reinforced, then it will continue in spite of other, negative consequences.

If one is to accept the premise that alcoholism is a behavioral coping response to stress, the following areas must be addressed: Does alcohol reduce stress, and if so, how?

Does alcohol reduce the symptoms of stress? Animal studies which have attempted to determine if stress is a causal link in alcoholism have had mixed results. In a review of these studies, Cappell and Herman (1972) reported the data to be "equivocal, negative and even contradictory" and felt that the tension-reduction hypothesis had perhaps outlived its usefulness. On the other hand, a more recent review by Hodgson, Stockwell, and Rankin (1979) argues that a TRH is supported by animal research in most cases where an appropriate paradigm to explain the behavior has been used.

Selye (1956) found an increase in adrenocortical secretions during the alarm stage of the GAS. Does alcohol have a chemical effect on common physiological measures of stress? In a study of nonalcoholic humans, it was found that levels of corticosteroids were reduced by a low dose of ethanol (Pohorecky et al., 1980). In this study, foot shock was used as a stress-inducing aversive stimulus. Since alcohol ingestion reduced corticosteroid levels, the authors felt this was supporting evidence that alcohol reduced the biochemical consequences of stress. Other studies of nonalcoholic clients (Geber and Anderson, 1967; Stassen, Neff, and Meittinen, 1976) showed a normalization of the physiological responses to stress upon ingestion of alcohol. Greenberg and Carpenter (1957) and Lienent and Traxel (1959) studied the effects of alcohol on galvanic skin response (GSR). They found that among nonalcoholic clients, large amounts of alcohol reduced the GSR.

Among alcoholic clients, similar results have been shown (Gross et al., 1978; Begleiter and Platz, 1972; Naitoh, 1972). It seems fairly conclusive that ingestion of alcohol can reduce the physiological manifestations of stress.

Alcoholic behavior can be partially accounted for by social learning and operant conditioning as a response for reducing tension. There is support for this on the cognitive, behavioral, and physiological levels. If alcohol use, as a coping response to stress and tension, is learned, then, theoretically, alternative tension-reduction responses can also be learned. The remainder of the chapter will focus on those techniques.

Treatment Interventions

A number of interventions that have been used to reduce tension and/or anxiety in nonalcoholic clients may also have utility in helping alcoholics whose condition seems to be precipitated by stress, or as

a learned coping response to stress. Techniques that have been reported to be useful in reducing tension are various types of biofeedback such as electromyogram feedback, finger-temperature feedback, alpha wave feedback, relaxation training, meditation, autogenic training, and aerobic exercise. These interventions have been shown to generally reduce oxygen consumption, respiration rate, heart rate, muscle tension, and in some cases blood pressure. In addition, an increase in alpha wave production and skin resistance have been demonstrated.

Biofeedback and Relaxation Training

Since biofeedback and relaxation training are often confounded in the research, the literature on these two areas is discussed together. The three types of biofeedback treatments reviewed in this chapter are electromyogram (EMG), electroencephalogram (EEG) for alpha wave training, and finger-temperature feedback.

Electromyogram. The use of EMG feedback assumes that tension in alcoholics is manifested in muscle tension. The studies reviewed all use the frontalis muscle as the dependent variable to indicate reduced tension.

Kurtz (1974) was one of the first investigators to look at the potential of EMG and EEG training as means of reducing tension in alcoholics. He assigned thirty-five inpatient alcoholics to a treatment group which received the regular therapy program and EMG and EEG biofeedback training ninety minutes a day, five days a week, instead of group therapy. An additional thirty-five alcoholic inpatients were used as controls, receiving their regular therapy program and going to group therapy during the biofeedback time. The subjects stayed in the program a minimum of twenty-eight days, with a maximum of six weeks and a mean stay of thirty days. Their blood pressure and pulse were taken before and after each training session. The in-session change in blood pressure decreased 7 mm. systolic, 5 mm. diastolic, with the pulse decreasing 4.3 beats per minute. Over the course of the treatment the experimental group's blood pressure decreased an average of 17.4 mm. systolic, 8.8 mm. diastolic, while the control group's blood pressure increased 7.7 mm. systolic and 2.57 mm. diastolic. No followup data or drinking behavior data was reported. Steffen (1975) trained four chronic alcoholics over a three-day period to reduce frontalis muscle tension. During the second phase of the study, liquor was available as long as the blood alcohol level did not exceed 250 mm. % on a given day over a twelve-day period. Phase 3 involved detoxification until the blood alcohol level was reduced to zero percent over a two-

day period. Phase 4 consisted of fourteen sessions of general, forearm, and frontalis tension reduction training with and without EMG feedback. The cycle was repeated for forty-one days. The results indicated that the training led to decreased subjective mood disturbance, lowered EMG activity level, and lowered blood alcohol levels. There was no decrease in the number of drinks ordered.

Eno (1975) investigated the use of EMG-assisted relaxation training for reducing the tension level of fifty institutionalized male alcoholics. She had five groups: a no-treatment control group, a relaxation training group, a biofeedback-only group, a combined relaxation and biofeedback training group, and a control group enrolled in an established rehabilitation program. The results demonstrated that the combined biofeedback and relaxation group attained the lowest EMG level. There were significant changes in EMG level in the biofeedback only, relaxation training only, and the combined group, but not in the control groups. The relaxation training-only group had lower EMG levels than the biofeedback-only and the two control groups. The control groups did not change in EMG level. There was no significant difference between and within the groups on the self-reporting State-Trait Anxiety Inventory scores from pre- to post-test. Drinking behavior data was not reported.

Strickler et al. (1977) investigated the effect of one session of systematic relaxation training on the EMG tension level of abstinent alcoholics participating in an outpatient Antabuse maintenance treatment program. The subjects were given relaxation instructions or neutral material prior to listening to a tape recording of drinking-related stimuli. It was found that brief instruction in relaxation was adequate to significantly reduce the subjects' frontalis EMG levels; the exposure to the drinking-related stimuli significantly increased these EMG levels; and prior relaxation instructions protected the subjects from the EMG tension-inducing effects of the drinking-related tape.

Lenigen (1977) used a component control design to study the effect of EMG biofeedback and relaxation training on the performance of alcoholics under stress. He divided forty-one patients into a feedback-only group, a relaxation training-only group, an EMG plus relaxation training group, and a control group in which the subject merely rested for twenty-six minutes for five sessions. The dependent variable was frontalis muscle tension. In addition, cervical paraspinal muscles were monitored to measure generalization of training effects. The response latency measures on a post-test task were also used as indirect indices of autonomic nervous system balance. Lenigen found that the biofeedback treatments without supportive interventions did not reduce muscle tension during training or improve the performance on the post-test. The relaxation training reduced the frontalis muscle tension but

did not generalize to the cervical paraspinal muscles. The relaxation training had no effect on the response latency post-test. In addition, the alcoholics were neither unusually anxious according to two psychological tests nor were they more muscularly tense than nonalcoholics. No drinking behavior data was reported. Lenigen suggested that the data does not support the theory that alcoholics, who are theoretically anxious and use ethanol to maintain autonomic nervous system balance, are good relaxation candidates.

In an attempt to be more prescriptive in the use of biofeedback, Page and Schaub (1978) studied EMG biofeedback applicability for differing alcoholic personality types. Thirty-two male inpatient alcoholics were divided into two groups on the basis of their Minnesota Multiphasic Personality Inventory (MMPI) profile. Group 1 consisted of tense and anxious subjects, while group 2 was a more heterogeneous collection of personality types. Eight subjects from each group received fourteen days of progressive relaxation training and EMG biofeedback, while control subjects were given sessions of taped music and EMG monitoring. The group 1 relaxation and EMG feedback component had lower EMG levels than group 2 or the control group. All of the groups reported an increase in improved mood states, but there was no difference in improved mood level between groups. Alcohol consumption data was not reported. The highly anxious subjects achieved lower EMG readings more rapidly than the heterogeneous group did with identical treatment. The researchers concluded that clients can be selected differentially for relaxation-biofeedback training through the use of the MMPI, and that clients who exhibit significant anxiety and tension can achieve lower levels of tension during training than clients with lower levels of pretreatment anxiety.

Hitchcox (1979) investigated the effectiveness of EMG-assisted biofeedback relaxation training in helping recovering women alcoholics to reduce their responsivity to stressful life events. She trained six recovering female alcoholics with five to nine sessions of frontalis EMG feedback and relaxation training, plus four to five sessions of exposure to stressful imagery in a single-subject replication multiple baseline design. The theme of the imagery was social stress. The dependent variables were frontalis and trapezius muscle tension level, hand temperature, self-awareness of relative tension levels, and subjective report of relaxation. The results indicated that frontalis feedback was effective in reducing high and moderate levels of tension to a normal range. The relaxation training was as effective as EMG feedback in facilitating relaxation. There was no relationship between the EMG level and hand temperature. Those subjects who had a low baseline temperature demonstrated a decrease in EMG level and an increase in hand temperature. There was some evidence of a reduction in re-

sponsivity to stress. The five subjects who completed training (one subject dropped out and had started drinking again) showed a significant reduction in current craving for alcohol, perceived helplessness, and intensity of psychophysiological complaints. They also demonstrated a substantial concordance between the subjective and the objective indices of relative relaxation and tension. Continued sobriety was associated with successful practice involving the stress-reduction techniques and the imagery.

McWilliams (1979) studied the effects of EMG-induced relaxation with relaxation training as an adjunct to a regular rehabilitation program for alcoholics. He hypothesized that the learning of self-regulation of psychophysiological events such as muscle relaxation would facilitate otherwise stressed alcoholics to cope with tension in a more effective manner. He assigned sixty male alcoholics to an EMG relaxation training group or an attention placebo group. The State-Trait Anxiety Inventory and the Physiological Manifestation of Anxiety Scale were used as dependent-variable measures. The results suggest strong evidence for the efficacy of EMG feedback-induced relaxation training with muscle relaxation training, but there was a limited correlation with the subjects' report of anxiety. The alcoholics receiving EMG training indicated more awareness of physiologically manifested anxiety symptoms. There was no followup on drinking behavior.

Rosenberg (1980) assumed that alcoholism is a multiple-syndrome group of disorders and hypothesized that relaxation therapy would be an effective treatment for alcoholic clients whose drinking is highly related to anxiety. He assigned fifty-nine male outpatient alcoholics to an EMG biofeedback-assisted relaxation group, with relaxation practice between sessions (six 30-minute sessions), or to a control group that received six 30-minute sessions of alcohol education. The State-Trait Anxiety Inventory and the Alcohol Use Inventory were used to measure aspects of the dependent variables. The results suggested that EMG-assisted relaxation was effective in reducing transitory states of subjective discomfort and physiological tension.

The relaxation subjects who scored high on anxiety related to drinking demonstrated a significantly greater improvement on all of the alcohol-use measures than did the control subjects who scored high on anxiety related to drinking. In contrast, no differences on any of the alcohol-use measures were reported between the experimental and control subjects who were not high on anxiety related to drinking. Additionally, the experimental subjects who frequently used the relaxation technique outside the treatment sessions demonstrated a significantly greater improvement on two or three of the alcohol-use measures than those subjects who infrequently used the relaxation technique. Rosenberg concluded that anxiety reduction may be ex-

pected to produce a decrease in alcohol use only for subjects whose drinking is highly related to anxiety.

EMG biofeedback has been effective in reducing the EMG level in institutionalized alcoholics, according to all the studies reported here (Eno, 1975; Steffen, 1975; Strickler et al., 1977; Page and Schaub, 1978; Hitchcox, 1979), with the exception of Lenigen (1977). Self-report data indicated reduced tension (Steffen, 1975; Page and Schaub, 1978; Hitchcox, 1979; McWilliams, 1979; Rosenberg, 1980), with the exception of Eno (1975). Finally, EMG is effective in reducing blood pressure and pulse rate (Kurtz, 1974). Minimal data indicate that EMG biofeedback is not successful in reducing drinking behavior, yet is related to reduced blood alcohol level in inpatient alcoholics (Steffen, 1975). It also has some initial promise in assisting recovering alcoholics to remain sober (Hitchcox, 1979). The majority of studies in this area have not reported drinking behavior data. In addition, many of the studies have confounded the treatment results by combining EMG biofeedback and relaxation training (e.g., Strickler et al., 1977; Page and Schaub, 1978; Hitchcox, 1979; Rosenberg, 1980). In those studies utilizing a component control design, a combination of EMG biofeedback and relaxation training or relaxation training alone was found to be superior to EMG biofeedback alone in reducing muscle tension. Since anxiety and tension can be manifested in various systems differentially (i.e., specific muscles and/or the cardiovascular system), reducing frontalis muscle tension will not necessarily reduce tension manifested in other parts of the body. Therefore a more general approach such as relaxation training has a higher probability of being successful. To date, the use of EMG warrants consideration as an intervention; however, further research is needed to demonstrate that specific types of anxious alcoholics exhibit their tension muscularly, and that the frontalis muscle is the appropriate feedback site. Furthermore, it still needs to be demonstrated that EMG feedback to develop tension-reduction skill is more effective than the other techniques. The research does not support the clinical use of EMG feedback for tension reduction in alcoholics.

Alpha Wave Biofeedback. An alternative to the EMG training has been to teach alcoholics to increase their alpha wave production. The rationale for this approach is that the "relaxation state" is associated with increased alpha wave production and thus such production may be an effective technique for reducing anxiety or tension. A secondary consideration is that increased alpha wave production has been associated with altered states of consciousness in meditation and thus may be an alternative vehicle for those alcoholics who use alcohol to "get altered." The research in this area is unimpressive to date. Wong

(1976) assigned twenty-four male inpatient alcoholics to either an experimental or control group. The experimental group was trained during fifteen hour-long sessions to increase the production of alpha waves, while the control group received an attention placebo treatment consisting of a placebo form of alpha wave biofeedback. No alpha wave production data was reported, nor was drinking behavior data reported. Wong found that the experimental group experienced more congruence between actual and ideal self-concept as well as greater improvement in scores on the repression-sensitization scale following treatment. Kurtz (1974) reports significant reductions in blood pressure as a result of EMG and EEG training but does not describe the relative contributions of these training procedures to the effect. Jones and Holmes (1976) tested the assumption that alcoholics produce fewer alpha waves than nonalcoholics. They trained twenty chronic alcoholic inpatients and twenty nonalcoholic, nonhospitalized subjects during three sessions of alpha wave feedback. There were no significant differences in ability to produce alpha. Jacobson, Wilson, and LaRocca (1977) trained thirty abstinent alcoholics and thirty nonalcoholic controls over five sessions in one of three experimental groups: accurate feedback, inaccurate feedback, and a no-treatment control group. They found no significant differences, as none of the groups demonstrated success in producing alpha. Passini et al. (1977) assigned twenty-five alcoholics to an experimental group which received two sessions of finger-temperature training and ten hour-long sessions of alpha wave training over three weeks. Twenty-five matched subjects were assigned to a no-treatment control group. The two groups were equal in regard to the amount of alpha produced with eyes open and closed in the pre-session assessment. The control group demonstrated no change after the experimental training period, while the experimental group was able to produce a significant increase in alpha waves. The alpha training appeared to significantly reduce self-reported anxiety, but no other measures demonstrated change. Drinking behavior data was not reported.

The utility of alpha wave training in reducing anxiety in alcoholics is uncertain. The studies reporting no effect may not have allowed an appropriate training period (three sessions, Jones and Holmes, 1976; five sessions, Jacobson, Wilson, and LaRocca, 1977). The studies reporting anxiety reduction (Kurtz, 1974; Passini et al., 1977) are confounded with EMG and finger-temperature training. To date, the relationship of alpha training to reduced or abstinent drinking behavior has not been demonstrated. The usefulness of alpha wave training with alcoholics remains to be seen, as well as its cost-effectiveness compared to other biofeedback or relaxation interventions.

Finger-Temperature Biofeedback. Temperature biofeedback is appropriate for tension that is manifested in the cardiovascular system. At this time, no data exists which demonstrates that anxious alcoholics do or do not manifest their tension in their cardiovascular system. The only studies employing temperature feedback either confounded it with other biofeedback information (i.e., alpha training—Passini et al., 1977) or consisted of anecdotal data (Green, Green, and Walters, 1974). According to the latter, preliminary investigations indicate that decreased alcohol consumption among a colleague's clients was associated with finger-temperature training. As this data is so minimal at this time, all that can be said is that the utility of finger-temperature biofeedback for tension reduction in alcoholics is unknown and awaits further research.

Relaxation Training. Relaxation training is the most promising tension-reducing technique for use with alcoholics. Litman (1974) used an intensive case study design to investigate the relationship between craving for alcohol and drinking to relieve unpleasant feelings in a 28-year-old male inpatient alcoholic and a 31-year-old female inpatient alcoholic. The subjects rated the strength of their negative feelings and cravings before and after each of eight to ten group therapy sessions (considered stressful situations) and seven to eight relaxation training sessions. Greater anxiety and craving were indicated in the woman but no changes were noted in the man after the group sessions. After relaxation training, less anxiety and craving were noted in both clients. Craving was related to anxiety in the woman and to somatic symptoms in the man. The preliminary data from this study supports the assumption that craving for alcohol may vary across subtypes of alcoholics, and relaxation training may minimize the craving and tension in some of the subtypes.

Meshbom (1977) studied the efficacy of experimental focusing and the use of visual imagery. She formed three groups of twenty inpatient alcoholics. The experimental group received three hour-long training sessions in progressive muscle relaxation and the technique of image focusing. The placebo control group received three lectures on alcoholism. The third group was a no-treatment control. The subjects were rated three times on the Gendlins Experiencing Scale and selected subscales of the Orlinsky-Howard Therapy Session Report (used as a measure of progress over four weeks), plus the Belts Test of Vividness of Imagery (before and after treatment). Meshbom concluded that training in imagery had a strong positive effect on patients' in-therapy behavior and that it was a successful method for improving prognosis for alcoholics in psychotherapy. Physiological data and outcome data

were not reported. The relaxation training and training in imagery were confounded in the experimental group, thus limiting any conclusions that may be drawn from this study.

In a study designed to evaluate the effect of assertion training and relaxation training as adjunctive treatments in an ongoing inpatient rehabilitation program, Krummel (1977) argued that alcoholics experience stress and react with anxiety because they have below-average interpersonal and tension-reducing skills. He hypothesized that training in assertion and relaxation should assist in the alcoholics' recovery. Fifty-seven male inpatients were randomly assigned to one of three conditions: an assertion group that included behavioral rehearsal, vicarious observation, and homework assignments; a progressive relaxation group that practiced outside of the group twice a day; and an attention placebo control group that participated in unstructured activities such as making macrame and ceramics. The groups met two times a week for ninety minutes over a four-week period. The Assertiveness Questionnaire, the Locus of Drinking Control Scale, the Locus of Control Scale, the State-Trait Anxiety Inventory, and a semantic differential of self were used as pre- and post-test measures. A six-month follow-up showed no improvement of either abstinence or reduced drinking compared to the control group. In addition, no significant differences were noted on any of the self-report measures. This study confounds a number of treatment variables in the groups, reports no physiological data, and uses self-report as a dependent measure. The strength of this study is that it is one of the few that has a behavioral follow-up. One can tentatively infer that assertion and relaxation training adds little to the rehabilitation of chronic alcoholics.

In yet another type of treatment-comparison study, Henricksen (1979) compared a progressive relaxation group, a meditation group, and a placebo control group on mood stability, state-anxiety, and their effect on perceived locus of drinking control. The subjects were alcoholic inpatients, who received fourteen 35-minute daily sessions. The study found significant differences only for the confusion-bewilderment factor, reflecting a difference in an organized/disorganized aspect of emotion. There was no significant difference in mood stability or state-anxiety across the categories and treatment groups. Significant decreases in state-anxiety were reported for alcoholic subjects classified as having an external perceived locus of drinking control, as opposed to those subjects having an internal locus of control. The externals also reported higher pre- and post-test anxiety scores than internals. Hendricksen did not report physiological data nor any behavioral follow-up data.

Gilbert, Parker, and Claiborn (1978) compared the effects of pro-

gressive relaxation, meditation training, and quiet rest on the mood levels of thirty male alcoholics in an inpatient setting. The Profile of Mood States was used for pre- and post-test measures. The progressive relaxation and meditation conditions produced significant decreases in self-reported tension, while the quiet-rest group reported no change on any of the six subscales of the profile. The progressive relaxation group also reported decreased depression as well as a trend toward increased vigor. The meditation group seemed to exhibit a restful alertness, while the progressive relaxation group seemed to experience an energizing effect from the treatment.

Parker, Gilbert, and Thoreson (1978) compared the effects of progressive relaxation training and meditation training on autonomic arousal in alcoholics in an inpatient setting. The subjects were randomly assigned to one of three groups: a progressive relaxation training group, a meditation group, or a quiet-rest control group. The groups met for three weeks. During the training period blood pressure, heart rate, galvanic skin response, and state-anxiety (according to the State-Trait Anxiety Inventory) were measured. The researchers found that the progressive relaxation and meditation groups were successful in reducing blood pressure. In addition, the meditation training group had blood pressure decreases at an earlier point in the training period, and meditation had an effect on systolic blood pressure that progressive relaxation training did not. No drinking behavior data was reported. In a related study reporting the same subject information and using the same design and dependent measures, Parker and Gilbert (1978) also report that the two treatment groups did not show an increase in blood pressure but the control group did. These results support the hypotheses that tension may be manifested in different systems in the body and that various tension-reducing techniques may differentially affect them. These studies by Parker, Gilbert, and Thoreson (1978), Parker and Gilbert (1978), and Gilbert, Parker, and Claiborn (1978) indicate that relaxation training and meditation can be effective according to physiological measures and subjective self-reports. However, none of the above studies report any drinking behavior data or follow-up data on continued use of the techniques.

Alcoholics are thought to be deficient in social skills as well as coping responses to stress. Teare (1978) suggested that we need to assess individual differences in alcoholics' response to intrapersonal and interpersonal stress in order to determine the most suitable therapy for specific alcoholics. She assigned forty-four outpatient alcoholics to one of the following groups: hatha yoga, human relations training, and relaxation training. The subjects received sixty to ninety minutes of their treatment per day during an eleven-day period of a twenty-day "eclectic" six-hour-a-day therapy program. The Maximult, the So-

cial Competence Scale, and "several measures of anxiety and depression" were given as pretests. Post-test measures were completed by three therapists and a friend or spouse. None of the three treatments produced significant improvement (significance level set at $p < .05$ according to post-test measures of anxiety, depression, hypochondriasis, and schizophrenia. This study's results are probably attributable to other treatment variables or expectancy effects due to the confounding of the treatments with the other treatment components of the outpatient setting. In addition, no physiological data, drinking behavior data, control data, or follow-up data were reported.

Frank (1979) investigated the use of guided versus nonguided imagery, combined with progressive muscle relaxation, for the treatment of chronic alcoholics in a Salvation Army rehabilitation program. Ninety chronic alcoholics were randomly assigned to two experimental treatment groups on two consecutive days for ninety minutes or to a control group, which had an informal conversation hour. The two experimental groups significantly reduced the alcoholics' level of state-anxiety when compared to the no-treatment control. There was no difference between the guided and nonguided imagery groups. This study confounded the imagery treatment with the use of progressive muscle relaxation. The results were most likely due to expectancy effects or to the relaxation training. Since the alcoholics were reported to have poor control over the capacity for visual imagery, a relaxation-only group and an imagery-only group would need to be added to the design to aid in our understanding of these interventions. Physiological data, drinking behavior data, and follow-up data would also be needed in order to better understand the impact of the above treatments.

In one of the better-designed analogue studies, Strickler et al. (1977) studied the effect of relaxation training in reducing the impact of antecedent stress on alcohol consumption. They assigned twenty-four male students, ages twenty-one to twenty-nine, designated as heavy social drinkers, and matched on duration of drinking behavior, to one of three experimental conditions: relaxation instructions; a sensitization, stress-enhancing condition; and a neutral control consisting of listening to a tape of a section of *National Geographic*. All of the subjects were told they would have to give a public speech and told to wait and listen to a tape. Drinking style and amount of alcohol consumed were measured in an ad lib drinking session in which the subjects were told to wait for their turn to get a drink and they could drink if they wanted to. Galvanic skin response was used as a measure of arousal. The post-test drinking rates significantly differed between the groups. The post-test drinking rates in the stress sensitization group were significantly higher, while the relaxation group had signifi-

cantly lower drinking rates and there was no difference in the neutral group. Relaxation training reduced arousal and the sensitization conditions increased arousal. The relaxation group drank significantly less than the other two groups. In fact, the relaxation subjects slowed down their initial drinking rate in the presence of an anticipated stressful event. The stress-influenced changes in drinking style represented a shift toward more abusive drinking.

The results from Strickler et al. (1977) suggest that relaxation training may in some way insulate the individual's drinking style from environmental stress. The researchers noted that some responses to stress cues (e.g., rumination) were associated with significant increases in sip rate and therefore alcohol consumption. Relaxation during stress seems to minimize the impact of stress on drinking rate and amount. The Strickler study (Strickler et al., 1977) suggests that relaxation training in conjunction with a behavioral focus on drinking rate may increase the probability that a moderate drinking style will be practical in stress situations. Furthermore, additional research on the impact of antecedent stimuli on drinking patterns of young social drinkers may indicate that improving their repertoire of effective coping behaviors can reduce the likelihood of later progression to a more abusive drinking style (Strickler et al., 1977).

The Strickler study is one of the few to examine a stress-reduction technique as a preventive intervention and to use drinking behavior as a dependent variable. The study is an analogue study with heavy social drinkers, and thus further research with alcoholics is needed to demonstrate the utility of this technique as a preventive or remedial treatment.

The relaxation-training techniques have the most promise for use with alcoholics. Progressive muscle or autogenic relaxation has been shown to reduce self-reported anxiety or tension for inpatient alcoholics (Litman, 1974; Gilbert, Parker, and Claiborn, 1978; Teare, 1978; Frank, 1979) and for subpopulations of anxious alcoholics (Hendrickson, 1978). The techniques have also reduced alcoholic craving (Litman, 1974) and blood pressure (Parker, Gilbert, and Thoreson, 1978). Krummel (1977) did not find significant changes in self-reported anxiety or drinking behavior with a chronic inpatient population and his results were confounded with other treatments.

In the one experimental analogue study (Strickler et al., 1977), the results were impressive. With heavy social drinkers, relaxation training not only reduced the anxiety level but also aided in restraining drinking behavior. This study is encouraging insofar as we may be able to teach relaxation training in alcohol education programs as an alternative coping technique. This finding is consistent with the assumption that a subgroup of individuals who drink do so to reduce

tension and anxiety. Thus training them in alternate coping techniques may have a great deal of promise in alcoholism prevention programs.

The relaxation training outcome literature indicates that inpatient and abstinent alcoholics can learn to reduce their anxiety level in regard to self-perceived and physiological tension. However, at this time we do not know if this type of training will have any impact on their drinking behavior. The drinking behavior is the most important outcome variable and we have to start including it in our outcome research. After all, what good will it do us as therapists to have more relaxed drunks on our hands?

Meditation

Techniques such as mantra meditation, zen meditation, or yoga meditation have been effective in reducing oxygen consumption, respiration rate, and heart rate; increasing alpha wave production and skin resistance (Benson, Beary, and Carol, 1974; Swinyard, Chaube, and Sutton, 1974); and decreasing blood pressure (Parker, Gilbert, and Thoreson, 1978). These meditation techniques hold promise for reducing tension in alcoholics (Swinyard, Chaube, and Sutton, 1974). The most commonly used meditation technique studied is the mantra meditation. In a mantra meditation the subject focuses his or her attention on a nonsense syllable or personally meaningless word, repeating it over and over for a period of fifteen to twenty minutes twice a day.

The early research in the use of meditation was descriptive. Benson (1974) did a retrospective study of alcohol intake associated with meditation. He analyzed questionnaire data from 1,081 males and 781 females who had practiced transcendental meditation, or TM (a mantra meditation), for at least three months as part of their training to become TM teachers. The results indicated a decrease in consumption of hard liquor after starting TM, and after twenty-seven to thirty-three months of practicing TM their consumption dropped to 0.4 percent of what it had been when they started the program. This data was retrospective and no information was available on the number of alcoholics in the sample. As these people were already interested in TM, applicability to treatment of alcoholism is at best speculative. In a similar study, Shafti, Lavelly, and Jaffe (1975) investigated the frequency of alcohol use among transcendental mediators (N = 126) and a matched control group (N = 90). Forty percent of the meditators who had meditated for two years stopped drinking after six months.

After twenty-five to thirty-nine months 60 percent had stopped drinking. None of the control group had stopped drinking. Finally, 45 percent of the meditators versus one percent of the control group had stopped drinking hard liquor. This was a descriptive study subject to the same limitations as Benson's (1974) study.

The outcome research is minimal. Kline (1976) trained thirteen recovering alcoholics in transcendental meditation over three months. He pre- and post-tested the experimental and no-treatment control groups with the MMPI, Rotter's Internal-External Locus of Control, and the Tennessee Self-Concept Scale. No meaningful results were found. This was probably due to the small sample size, two inappropriate dependent variables, and/or a lack of physiological data. Nuernberger (1977) investigated the effect of meditation on personality variables of inpatient alcoholics. He assigned 143 male inpatient alcoholics to one of the following: a four-week meditation training group, a pretest control group, or a post-test control group. The experimental group received meditation training twice a day and the pretest control group received two 30-minute didactic sessions on positive psychological health. There were no significant differences between the group on any of twenty-four personality scales, while the pretest control and experimental groups showed improvement on the Personal Orientation Inventory, a measure of self-actualization. This study offers little to the outcome literature, as it used dependent variables that are of little consequence to the clinician who needs to help the client reduce anxiety and reduce or stop drinking behavior. No physiological or drinking behavior data was reported. Gilbert, Parker, and Claiborn (1978), Parker, Gilbert, and Thoreson (1978), and Parker and Gilbert (1978), whose research was discussed in the relaxation training section, found that meditation and relaxation both resulted in self-reported decreases in tension and reduced blood pressure. In addition, meditation training induced decreases in blood pressure faster than relaxation training and affected decreases in systolic pressure that progressive relaxation training did not. Heart rate and galvanic skin response were not affected. Drinking behavior data was not reported.

These studies indicate that alcoholics using meditation can experience tension reduction as indicated by self-reports and physiological data. However, the data is preliminary in what we do not know what types of alcoholic, if any, differentially benefit from the meditation versus the relaxation technique, as the two techniques did result in somewhat different outcomes. Meditation training may be a useful adjunct as a tension-reduction tool, particularly as some clients may be more attracted to meditation than the various kinds of relaxation training.

Autogenic Training

Autogenic training has been widely used and researched in Europe. It involves a series of six standard exercises (e.g., "My arms and legs are heavy and warm, my heartbeat is calm and regular") and six advanced mental imagery exercises. Luthe and Schultz (1969) present a synthesis of this data and suggest that the exercises "have been found helpful in the treatment of habitual alcoholism." Autogenic training has comparable physiological effects to relaxation training and meditation, and thus has potential for treating stress in alcoholics. Luthe and Schultz report that "the exercises have been particularly praised by patients who once used to seek in alcohol a relief from intolerable tension and rising anxiety." They note that one group of thirty alcoholics treated in a state hospital had not had one relapse in a two-year follow-up. These authors report similar results in terms of tension reduction, improvement in sleep patterns, and increased motivation. Luthe and Schultz found that reduction in anxiety seems to be a reinforcing event, which, through stimulus generalization, is transferred to the entire treatment program and increases the probability of the client persisting in therapy. Since sleep disturbances are also associated with alcoholism, this effect is important. At this time the preliminary reports are encouraging. However, further outcome research in this country is needed to establish the utility of the exercises here.

Aerobic Exercise

Little or no research has been done to investigate aerobic exercise as a tension-reduction technique for alcoholics. Gary and Guthrie (1972) assigned ten male alcoholic inpatients to a jogging group that worked out five days per week for four weeks or until twenty miles had been reached. Ten control subjects completed their normal daily routine. The researchers found significant improvement in cardiovascular conditioning and self-esteem after only twenty days of training. Sleep disturbances were reduced. This was an important finding, as the difficulty many alcoholics have in getting a good night's rest contributes to their level of stress. No improvement in drinking was noted on the follow-up. Pelletier (1977) reports the psychological effects of running on a nonalcoholic population. Subjects were found to be more intelligent, stable, venturesome, tender-minded, imaginative, experimenting, self-sufficient, sober, expedient, and self-assured. It was noted that the subjects experienced increases in creativity and energy, became more self-disciplined, and had a higher level of motivation; sexual

activity decreased but sexual satisfaction increased. Finally, the subjects slept less and had a lower level of anxiety. This study does not apply directly to treating alcoholics but demonstrates that the potential exists for using aerobic exercise with alcoholics. The experience of one of the authors adds anecdotal support to the use of aerobic exercise for reducing tension and moderating drinking behavior (six to twelve beers per week dropped to two or even fewer per week after three months of training).

Aerobic exercise has been shown to reduce heart rate, blood pressure, cholesterol level, and self-reported tension, as well as improve sleep and increase energy level. These are all areas of deficiency in the various types of alcoholics, and thus they may benefit from the inclusion of aerobic exercise in their treatment plan.

Conclusions

This chapter was based on the assumptions that (1) alcohol use, for a portion of the alcoholic population, is a socially learned coping response used to reduce tension, and (2) drinking behavior is enhanced or diminished as a function of social facilitation or modeling for subgroups of alcoholics. On the basis of these assumptions, teaching alcoholics tension-reducing coping skills is a logical component of the treatment process. The empirical findings on use of tension-reduction interventions with alcoholics are promising but inconsistent. The outcome studies generally indicate that subtypes of alcoholics report reduced tension and experience reduced muscle tension, reduced blood pressure, and improved sleep patterns. In addition, recovering alcoholics and heavy social drinkers demonstrate reduced craving and reduced alcohol consumption. Chronic alcoholics present a mixed picture. There seems to be a subgroup of alcoholics who are completely internally cued, drink under any conditions, and do not experience any benefits from these tension-reduction interventions. On the other side, chronic alcoholics who report higher levels of anxiety and/or are externally cued in their drinking behavior experience greater reductions in tension than the other chronic alcoholics.

The interventions are differentially effective. Progressive relaxation and autogenic training have the best support to date. Meditation (mantra) and EMG biofeedback have weaker support, particularly the EMG feedback. The EMG feedback was less effective than relaxation training and ineffective in some cases. This is most likely due to the specificity of the target area of EMG feedback versus the more general effect of the other three interventions. Alpha wave feedback is not supported, with the exception of Passini et al. (1977). Finger-tempera-

ture training remains to be investigated. Finally, aerobic exercise has promise but also has not been systematically studied.

Clinical Recommendations

Progressive relaxation, autogenic training, and the other techniques are appropriate for teaching alcoholics alternative ways to reduce self-perceived tension and physiologically manifested tension. The techniques are not sufficient treatments by themselves, but should be employed with other therapeutic components such as cognitive behavior therapy. The stress-reduction interventions can be used as a preventative technique with adolescents and heavy social drinkers. They also have promise for reducing blood pressure and improving sleep patterns in chronic alcoholics—common problems for this population. As a final note, the techniques can be used by abstinent alcoholics to reduce craving and to provide an "inoculation" effect for coping with stress in their lives. These stress-reduction treatments have two major benefits; (1) alcoholics can experience reduced tension on a variety of levels, which is an important treatment goal in and of itself; (2) those alcoholics who drink to reduce stress may be able to show a concomitant reduction in drinking behavior, although the data to support this is still preliminary.

Research Recommendations

As with most areas of mental health treatment, the clinical application of stress-reduction techniques with alcoholics is ahead of the research. To aid in our understanding of these techniques the following research is needed. In the areas of basic research, we need data on the various physiological systems in which alcoholics do or do not manifest tension, so that we can be more precise in our application of biofeedback techniques. Research needs to be continued on the learning history and characteristics of alcoholics who may differentially benefit from the use of these interventions. We need to use multiple dependent measures (Emrick, 1975; Emrick, 1983) with follow-up in the outcome studies such as self-report, physiological data on a variety of systems, and drinking behavior. As we become more refined in our use of these techniques, we will need cross-treatment effectiveness data. Finally, research is needed to examine the issue of differential effectiveness of the treatments across subtypes of alcoholics.

Alcoholism is a multidimensional syndrome and its complexity should be reflected in prescriptive treatment approaches. The integra-

tion of stress-reduction techniques with skills training, cognitive-behavior therapy, family therapy, and group therapy is an important step toward this goal.

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