Palmer, James Horton

SOME PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF AEROBIC EXERCISE ON ADULT INPATIENT ALCOHOLICS

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SOME PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF AEROBIC EXERCISE ON ADULT INPATIENT ALCOHOLICS

by

James Horton Palmer

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This dissertation has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro.

Dissertation Adviser _____

Committee Members _____

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The purpose of this study was to examine the usefulness of aerobic exercise as a treatment intervention with adult inpatient alcoholics. More specifically, it was hypothesized that regular aerobic exercise would decrease depression and anxiety levels in participants, while increasing aerobic capacity and self-concept level.

The State-Trait Anxiety Inventory, Self-Rating Depression Scale, Tennessee Self-Concept Scale, and Astrand-Rhyming bicycle-ergometer test were used as dependent measures, and were administered to a treatment and a control group on admission and again at discharge from a 28-day inpatient treatment program. Control group data were gathered prior to initiating the exercise program, with recruitment for the treatment-group beginning only after the last control was discharged.

Statistical analyses were conducted in the following manner. Descriptive information was gathered and reported for both the treatment and control group. Because series of t-tests found no significant differences between the exercise and control group on any of the pre-test measures, group equivalency was assumed and a multivariate t-test procedure was conducted on post-test scores using the General Linear

Models program of the Statistical Analysis System computer package.

Results of this procedure indicated that there were significant differences on post-test scores between the control and exercise groups on the State-Trait Anxiety Inventory and on the Self-Rating Depression Scale, but not on the Tennessee Self-Concept Scale and the Astrand-Rhyming bicycle-ergometer test. Therefore, the hypothesis that aerobic exercise improved depression and anxiety level in alcoholics was accepted, while the hypothesis that aerobic exercise improved aerobic-capacity and self-concept in alcoholics was rejected.

It was concluded that aerobic exercise is a useful treatment intervention, and should be included in inpatient alcoholism treatment.

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I wish to thank my entire committee, particularly Dr. Nicholas Vacc, my chairman, and Dr. Richard Jaeger, my statistician. I would also like to thank Dr. Diana Spitler, and her associates in the exercise physiology lab for use of their equipment and interns; and lastly Jack Rothrock, the Director of Fellowship Hall and his staff for their cooperation in planning and implementing this study.

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Chapter I

INTRODUCTION

America is in the midst of an aerobic fitness boom. An estimated nine to eleven-million Americans jog on a regular basis (Cooper, 1978) and in 1983, the fitness market totalled thirty-five billion dollars (Greensboro Daily News, 1984). Proponents of aerobic fitness have reported that increased fitness can aid in alleviating a wide range of mental and physical problems (Kostrubala, 1976; Glasser, 1975).

A sizeable amount of research during the last decade indicates that regular aerobic exercise has beneficial effects on the mind and the body. It lowers heart rate (Falls, Baylor, & Dishman, 1980; Massie & Shephard, 1972), decreases blood pressure (Goldberg, 1978; Buccola & Stone, 1975), increases maximum oxygen uptake (Wilmore, Royce, Girandola, Katch, & Katch, 1970) and decreases the percentage of body fat (Stamford, 1983; Bazzarre, Evans, Kinard, & Truslow, 1984).

The psychological effects of aerobic exercise are not as well defined, but studies conducted by Morgan, Roberts, Brand, and Feinerman (1970), Brown, Ramirez, and Taub (1978), and Blue (1979) demonstrated that aerobic exercise reduced depression levels. Lion (1978), Young and Ismail (1976), and Wilson, Berger, and Bird (1981) indicated that aerobic exercise reduced anxiety levels. Similarly, Jasnoski, Holmes, Solomon and Aquiar (1981) and Collingwood (1972)

reported that regular aerobic exercise led to improved self-esteem.

Research on the psychological effects of aerobic exercise has focused primarily on the effects it has on depression, anxiety, and self-esteem, three psychological dimensions that are also part of the symptomology of alcoholism, America's third largest health problem (National Institute on Alcohol Abuse and Alcoholism, 1978). Research studies by Keeler, Taylor, and Miller (1979), Weingold, Lachin, Bell, and Coxe (1968), Beck, Weissman, and Kovacs (1976), and the clinical data of Brill (1981), Barry (1974), Kissin (1977), and Fox (1968) indicated that alcoholics suffer a higher incidence of depression than do non-alcoholics.

Belfer, Shader, Carroll, and Harmatz (1971), Kraft and Wijesinghe (1970), Barnes (1980), Barnes (1979), Cox (1979), and clinical data by Fox (1968), and Forrest (1975) also indicated that alcoholics are more anxious than are non-alcoholics.

The literature indicates that alcoholics suffer from poor self-esteem (Gross & Adler, 1971, Caroll & Fuller, 1969, Felde, 1973, Vanderpool, 1969, O'Leary, Chaney, & Hudgins, 1978, Fox, 1968, Forrest, 1975, and Kissin, 1977).

Need for the Study

An estimated nine- to thirteen-million Americans are alcoholics (Hafen & Brog, 1983). Alcoholism, a progressive,

chronic disease, affects all aspects of an alcoholic's life (Johnson, 1977); body, mind, and spirit (Alcoholic's Anonymous Big Book, 1976).

Barth and Davis (1983) stated that proper treatment should focus on the "whole" person. Treatment has traditionally focused on only one aspect of the illness, such as cognitive control, and has stressed education and therapy (Kissin, 1977). Alcoholic's Anonymous is built along spiritual lines, emphasizing the need for help from a "higher power" in the process of recovery (Alcoholic's Anonymous Big Book, 1976). To date, little research has been conducted on the role of physical fitness in the rehabilitation of Alcoholics (Chavez, 1977).

Intuitively, it seems that aerobic exercise would be a useful adjunct in the treatment of alcoholism, since the literature indicates that exercise has a positive effect on depression, anxiety, and self-esteem. Gary and Guthrie (1972), Frankel and Murphy (1974) and Whiting (1981) examined aspects of the relationship between alcoholism and physical fitness with promising results, but the link between aerobic exercise and improved mental functioning in alcoholics has not been firmly established.

Accordingly, this study examined the effects of an aerobic-exercise treatment program on male and female adult alcoholics who were hospitalized for the treatment of their

illness. More specifically, the following hypotheses were tested:

A. Alcoholics who engage in an exercise program while in treatment will show greater aerobic capacity than will alcoholics who do not exercise while in treatment.

B. Alcoholics who engage in exercise while in treatment will show greater decreases in depression levels than will alcoholics who do not exercise while in treatment.

C. Alcoholics who engage in exercise while in treatment will show greater decreases in anxiety levels than will alcoholics who do not exercise while in treatment.

D. Alcoholics who engage in exercise while in treatment will show greater increases in self-esteem levels than will alcoholics who do not exercise while in treatment.

Definition of Terms

Aerobic Exercise. Aerobic literally means "with air" and is defined as any continuous, rhythmic exercise of the trunk and leg muscles capable of raising one's breathing and heart rate (Cooper, 1978). Examples of aerobic exercise are biking, walking, jogging, cross-country skiing, and swimming. For this study walking and jogging were used as the aerobic exercises.

Stretching exercises. Stretching exercises are exercises which prepare the body for work by flexing the large muscle groups. Stretching exercises were used to allow participants to warm-up and cool-down after aerobic exercise.

Alcoholism. Alcoholism is a chronic, progressive disease, the main symptom being the loss of control over the use of alcohol (Johnson, 1977). For this study, alcoholics were adult males and females who had voluntarily admitted themselves to an alcohol treatment center. No attempt was made to catagorize alcoholics by level or severity.

Depression. Depression is an affective disorder that is manifested by feelings and complaints of sadness, tearfulness, hopelessness, or of physiological disturbances manifested by sleep disturbances, appetite disturbances, or general feelings of fatigue (Zung, 1981).

Anxiety. Anxiety refers to subjective feelings of tension, apprehension, nervousness, and worry (Spielberger, 1984).

Self-esteem. Self-esteem is defined as the subjective feelings a person has about himself or herself with regard to his or her worth and value as a human being (Fitts, 1965).

This chapter has outlined briefly the research in the field of alcoholism as well as the literature in the field of exercise and mental health. It has presented a brief rationale for examining the effects of aerobic exercise in the treatment of alcoholism.

Chapter II will review in greater depth the literature on the psychological effects of aerobic exercise, with particular emphasis on three mental states: depression, anxiety, and self-esteem. Secondly, literature on the alcoholic personality will be reviewed. Finally, studies that have dealt with the physical rehabilitation of alcoholics will be reviewed and conclusions about the deficiences of research in that area will be made.

Chapter III will outline the procedures used in completing this study. The population will be defined, the dependent measures that were used will be described in detail, and the statistical procedures that were used will be explained. Chapter IV will present the results of data analyses, and in Chapter V, the conclusions, recommendations, and limitations of this study will be discussed.

Chapter II

REVIEW OF RELATED LITERATURE

Research has focused primarily on the effects of aerobic fitness on three psychological states: depression, anxiety, and self-esteem. Each of these will be reviewed.

Depression and Aerobic Fitness

Brown, Ramirez, and Taub (1978), using 728 college students as subjects, looked at the effects of a ten-week aerobics program on depression levels. The Zung Self-Rating Depression Scale (SDS), the Minnesota Multiphasic Personality Inventory (MMPI) depression scale, and a questionnaire on sleep were used as dependent measures. A variety of exercises were used, including jogging, wrestling, mixed exercises, tennis and softball. Post-test results indicated that depression levels improved for both depressed and non-depressed subjects in all exercise treatments except softball. Subjects who jogged five days a week showed the most gains, while those who played softball, which was the least aerobic condition, showed no change in depression level. The study concluded that physical fitness is often associated with a feeling of well-being and with reduced depression and anxiety regardless of the subject's age.

Utilizing a case-study design, Blue (1979) examined changes in two depressed psychiatric inpatients following ten weeks of three-times-a-week jogging. Using the SDS as a pre-

and post-measure, he found that both subjects showed significant movement toward lower levels of depression.

Morgan, Roberts, Brand, and Feinerman (1970) examined the relationship between depression and aerobic fitness in 101 adult male faculty and staff members at a large university. Aerobic training consisted of circuit training, jogging, swimming, and treadmill or stationary-bike riding. A non-exercise control group was composed of persons who applied to the program but were unable to participate due to scheduling difficulties. The SDS was used as a pre-post measure for level of depression. Following six weeks of aerobic exercise, post-test results indicated the following: (a) although 85% of the experimental group reported feeling better, there were no significant changes toward less depression in the subjects who were not initially depressed, (b) the 11 experimental subjects who were diagnosed as depressed on pre-treatment SDS scores showed significant improvement, and (c) the 11 depressed subjects moved out of the depressed range following six weeks of aerobic exercise.

Patients seeking help for depression were randomly divided into three groups by Greist, Klein, Eischens, Faris, Gurman, and Morgan (1979). Ten patients received running treatment three or four times a week for one hour with a "running therapist", six patients received time-limited psychotherapy, and 12 patients received time-unlimited psychotherapy. After ten weeks, there were no significant

differences in depression levels among the three groups as measured by the Symptom Checklist-90. The study concluded that running was as effective as either of the other forms of therapy in alleviating depression.

Runners competing in several road-races were administered the Lubin Adjective Checklist, Form 13, by Joesting (1981). Using a t-test to examine group means, she found that runners were significantly less depressed than was the non-psychiatric standardization sample. Due to the ex-post-facto nature of this research, it would be difficult to determine whether running alleviated depression or whether non-depressed persons chose to engage in aerobic running as a regular activity.

In an international review of sports and depression therapy, Antonelli (1982) summarized the current findings of research and concluded that aerobic exercise, particularly running, is often very effective in working with moderate depression in a wide range of settings with diverse populations.

The studies reviewed above support the hypothesis that aerobic exercise is helpful in the treatment of depression. Only the study by Morgan et al. (1970) reported no change in depression level for subjects following exercise, but the subjects were initially not depressed. Subjects initially diagnosed as depressed showed significant improvements. Similarly, the study by Blue (1980) found significant

improvements in two patients hospitalized for depression. Aerobic exercise appeared to work well in alleviating the symptoms of depression among persons diagnosed as clinically depressed.

In a study by Brown et al. (1978), subjects who participated in five-day-a-week jogging (the most aerobic condition in the study) showed the greatest improvements in depression levels, whereas subjects who participated in softball (the least aerobic condition) showed no changes. This appeared to indicate that the more aerobic the exercise condition, the greater the expected change in depression level.

The study by Greist et al. (1979) might have far reaching effects on the clinical treatment of depression. Jogging was found to be as effective as psychotherapy in alleviating the symptoms of depression. Treating depressed clients with aerobic exercise would be less expensive and less time-consuming than would the more traditional "talk therapies".

Self-Esteem and Aerobic Fitness

The idea that aerobic fitness improves the way one feels about one's self is almost universally stated in ancedotal reports by physically fit persons (Glasser, 1975; Kostrubala, 1976). The following review of studies attempts to substantiate the claim of improved self-esteem.

Jorgenson and Jorgenson (1979) surveyed 497 runners associated with running clubs throughout the southwest United States. Ninety-two percent of those who completed the survey questionnaire reported increased feelings of emotional well-being as a direct result of their running. Similarly, in a nation-wide poll of approximately 1500 randomly selected subjects, 80% of those who were physically active reported they "felt better in general" as a result of exercise (Harris, 1978).

Twenty-five pairs of male rehabilitation clients were matched by Collingwood (1972), who then randomly assigned one member of each pair to an experimental group and the other to a control group. The experimental group received one hour of physical training five days a week for four weeks. Post-treatment results on the Bill's Index of Adjustment and Values indicated that the experimental group demonstrated significant increases in positive body attitude, self-attitude, and self-acceptance, whereas the control group did not.

Jasnoski, Holmes, Solomon, and Aquiar (1981) conducted a study on the relationship between aerobic fitness and reports of self-confidence. Twenty college-age women participated in an exercise class for ten weeks. Post-class comparisons with members of a control-group waiting list indicated that the members of the exercise group reported greater improvements

in their perceptions of their confidence and abilities, as measured by a non-standardized questionnaire.

Berger (1980) completed a case study of a 35-year-old female runner who kept a journal while undergoing four months of psychoanalysis. An analysis of the tapes of the sessions and the journal material indicated that engagement in aerobic running satisfied inner psychodynamic needs and fostered self-understanding and self-acceptance.

A practicing psychiatrist, Kostrubala (1976), examined running as a mode of clinical treatment. He began running as a form of cardiovascular-disease prevention, and became a strong proponent of running as a treatment for a variety of psychological problems. In his anecdotal but important book, The Joy of Running (1976), he hypothesized that aerobic exercise increases one's self-esteem by allowing the runner to experience an altered state of consciousness, a mild euphoria commonly called "runners high". Although not supported by experimental data, Kostrubala speculated that other forms of aerobic exercise would lead to similar states of mild euphoria. In a similar anecdotal book, Positive Addiction, Glasser (1975) hypothesized that aerobic activities can lead to increases in feelings of self-worth by substituting positive habits such as running or swimming, for negative habits such as smoking or excessive drinking.

The popular hypothesis that runners have less common illnesses than do sedentary persons of a similar age was tested by McCutheon and Hassani (1981). A questionnaire on health, running habits, and readjustment to social change was completed by 410 persons. From this pool, 74 pairs of males and 32 pairs of females were matched; each pair contained a runner and a non-runner. Statistically significant differences were obtained between groups. In comparison to non-runners, runners rated themselves as healthier, as having less illness, and as feeling better about themselves. A weakness not addressed in this study was the possibility that runners run because they are healthier to begin with.

Rainey (1983) examined the effects of aerobic running with low self-esteem college students. Subjects were randomly assigned to one of three conditions: a non-running control group, a running-alone group, and a running-with-a-counselor group. The Tennessee Self-Concept Scale (TSCS) and the Twelve Minute Walk Run Test were used as pre- and post-measures. After ten weeks of running three times a week, only the running-with-a-counselor group showed significant improvements in physical fitness. There were no significant differences between groups on the TSCS. These findings are in direct contrast to the results of other studies cited above which indicated improvements in self-esteem as a result of aerobic fitness. A possible explanation may be the age of the subjects; the two other studies involved older adults.

Rainey (1983) concluded that aerobic running may be more appropriate at some stages of development than at others.

It is widely accepted in the popular press that increased aerobic fitness leads to improved self-esteem or self-worth. Proponents of aerobic fitness, such as Glasser (1975) and Kostrubala (1976) presented anecdotal, but convincing evidence that exercise improved one's overall feelings of self-worth. Similarly, survey research supported the hypothesis that increased fitness leads to increased feelings of self-esteem. The Harris and Associates poll (1979) found that 88% of the people who stated they exercised regularly said they felt better about themselves as a result. Although ex-post-facto in nature, the survey of runners done by Jorgenson and Jorgenson (1979) indicated that 92% of those surveyed felt running had improved their emotional well-being. McCutheon and Hassani (1981) found similar results when they matched runners with sedentary peers.

There appears to be less research on the relationship between aerobic exercise and self-esteem than on relationships between aerobic exercise and either depression or anxiety. This is understandable due to the nebulous nature of the construct self-esteem. The presence or absence of anxiety and depression can be more readily agreed upon and measured. This is not true of self-esteem, which may also be considered as "self-concept", "self-worth", or "self-image".

Collingwood (1972) found increases in positive self-attitude, while Rainey (1983) found no differences in self-concept between an experimental and a control group. These mixed findings may be due to imprecise instrumentation. It would appear that, when people are asked about what they perceive as a relationship between exercise and self-esteem, they report a highly positive correlation; however, standardized measures claiming to measure this relationship often show mixed results.

Anxiety and Aerobic Fitness

Using the State-Trait Anxiety Inventory (STAI), Form X-2, as a dependent measure, Lion (1978) found that discharged psychiatric patients living in a half-way house decreased their levels of anxiety significantly following two months of jogging for one mile three times a week. Anxiety scores for the control group members who lived in the same half-way house but did not exercise, increased during the same period of time. Only three patients were in each group, making generalization problematic.

Young and Ismail (1976) examined the psychological effects of four months of physical fitness training on 58 men. The training consisted of three 90-minute sessions each week, with subjects engaged in calisthenics, running, and self-directed recreational activities such as basketball, volley-ball, squash, handball, or swimming. Physiological measures to assess fitness were also gathered. Post-exercise

evaluations indicated that subjects with the greatest physiological changes displayed less anxiety as measured by the Multiple-Affect Adjective Checklist.

A running group of 20 subjects was compared to an organized exercise class of 12 subjects and a control group of 10 subjects in a study by Wilson, Berger, and Bird (1981). All three groups showed significant decreases in anxiety levels on the STAI following treatment. The control group did not exercise, but met as a group for lunch each day. The researchers speculated that an established "time out" diversionary period each day, could be effective in controlling anxiety.

In a similar study Bahrke and Morgan (1978) found exercise, non-cultic meditation, and simple quiet time to be equally effective in reducing state anxiety . Seventy-five subjects were randomly assigned to the three conditions. The exercise group exercised for 20 minutes at 70 percent of their maximum heart rate, the meditation group practiced progressive relaxation for 20 minutes, and the control group sat quietly in a recliner for 20 minutes. The STAI was administered prior to, directly following, and ten minutes after completion of the activity. Results indicated that a significant reduction in state anxiety took place under each treatment condition.

Cox, Evans, and Jamieson (1979) measured the aerobic power of 70 undergraduate psychology students using a Monark

bicycle ergometer to measure maximum oxygen uptake. The students were then subjected to a series of contrived psychosocial stressors while their heart rates were monitored. Analysis indicated that subjects with high aerobic power recovered more quickly from the effects of psychosocial stressors than did low-fit subjects.

Hammer and Wilmore (1973) examined the relationship between physiological changes and personality measures as a result of a 10-week jogging program. The Taylor Manifest Anxiety Scale was used to measure anxiety level. Unlike previously cited studies, more-fit subjects exhibited significantly higher levels of anxiety than did the less-fit subjects. Because demographic information was not reported for the the two groups, comparisons with other studies are not possible.

A client with specific agoraphobic anxiety was treated by Muller and Armstrong (1975) using jogging as the treatment modality. It was hypothesized that the physiological manifestations of anxiety would be similar to those experienced following exercise, and through experiencing feelings of fatique, shortness of breath, and rapid heart rate as a result of jogging, the client would learn to control her agoraphobia. The client and therapist jogged to a department store where the client was able to ride an elevator up and down one floor. With repeated jogging and

elevator-riding sessions, the client was able to resume regular use of elevators with a minimum amount of fear.

An assessment of the psychological effects of aerobic exercise on a normal sample of healthy middle-aged adults was carried out by Blumenthal, Williams, Needels, and Wallace (1982). Sixteen subjects, enrolled in an adult-fitness program, were matched for age, education, sex, and health status with a control group of community volunteers. In the treatment phase, subjects exercised for one hour three times a week. Exercise sessions consisted of warm-up and stretching exercises followed by 45-minutes of walking or jogging. The subjects were given the STAI to assess anxiety level. Following the 10-week exercise program, the trait anxiety scores of the exercise group were reduced significantly; while the mean level of the control group did not change. The control group's state anxiety scores increased over the 10-week period, while the exercise group's scores decreased.

Schwartz, Davidson, and Goleman (1978) hypothesized that anxiety is not a global internal state, but is more specific in nature. To test their hypothesis,they developed a scale which divided anxiety into two components, somatic and cognitive. The scale was administered to a sample of 77 subjects, 44 of whom practiced regular physical exercise and 33 of whom practiced meditation. An analysis of variance, with groups as a between-subjects factor and mode of anxiety

(cognitive vs. somatic) as a repeated factor, revealed that meditators reported more somatic anxiety than did exercisers and exercisers reported more cognitive anxiety than did meditators. These results supported the researchers' hypothesis of the specific nature of anxiety. The important fact for the present review, is that somatic anxiety was lower for exercisers. The study, however was ex-post facto in design and results should be interpreted cautiously.

All the reviewed studies, except the study by Hammer and Wilmore (1973), found that aerobic exercise lowered anxiety levels of undergraduate to middle-age adults. The Hammer and Wilmore study found less-fit subjects to be less anxious than were more-fit subjects. These findings were in direct contrast to the findings of Young and Ismail (1976) who found highly-fit, middle-aged males to be less anxious than were their less-fit peers. Also in contrast were the results of Cox, Evans, and Jamieson's (1979) study of undergraduates and aerobic power. More aerobically fit subjects recovered faster from stress than did less-fit subjects. Also of interest was the comparison between the effectiveness of aerobic conditioning and meditation in alleviating anxiety. Meditation and progressive-relaxation training are accepted methods of anxiety control (Schwartz, Davidson, & Goleman, 1978). Exercise and non-cultic meditation were equally effective in controlling anxiety (Bahrke & Morgan, 1978; Schwartz, Davidson & Goleman, 1978). The studies reviewed

suggest that aerobic exercise is as effective in controlling anxiety as is meditation, a widely used anxiety-reduction technique.

Alcoholism

Following is a review of experimental and clinical studies on the alcoholic personality with particular emphasis on depression, anxiety, and self-esteem levels among alcoholics.

Alcoholism and Depression

Keeler, Taylor, and Miller (1979) studied the prevalence of depression among 35 alcoholic men following detoxification. Clinical diagnosis, based on the Diagnostic Statistical Manual II (DSM II), categorized 8.6% of the subjects as depressed, while the Hamilton Depression Rating Scale found 28% of the sample to be depressed, the SDS labeled 66% as depressed, and the MMPI indicated 43% were depressed. The study concluded that variations in diagnostic criteria account for much of the variance in the percentage of alcoholics who are diagnosed as being depressed, and cautioned against using only one measure. Using the best standardized instruments available, between 28% and 66% of the sample was labeled as depressed.

The SDS was also used by Cox, Weingold, Lachin, and Bell (1979) to measure the depression levels of 105 male inpatients in a state-hospital alcohol unit. Seventy percent of those tested scored in the mild-to-severe depression

range. Subjects were divided into three treatment groups based on the type of medication they were receiving. Post-testing revealed that all three groups showed significant decreases in depression as a result of inpatient treatment and medication.

Depressed alcoholics, alcoholics without depression, and non-alcoholic patients were compared by Woodruff, Guze, Clayton, and Carr (1973). Findings indicated that subjects with alcoholism and depression resembled alcoholic patients without depression more than they resembled non-alcoholic patients with depression only. A relevant finding was that when clinical criteria to detect depression was used, 56% of the male alcoholics and 34% of the female alcoholics were depressed.

Rohan, Tatro, and Rotman (1969) examined depression and anxiety level changes in 58 male alcoholics during hospitalization. The MMPI was administered at admission and two and a half months later at discharge. Based on changes in MMPI scores, the alcoholic group felt significantly less depressed and anxious at discharge, although they were more depressed than members of the the non-alcoholic standardization sample.

The relationship between alcoholism, hopelessness, depression, and suicidal behavior was examined by Beck, Weissman, and Kovacs (1976). Their sample consisted of 378 persons who had previously attempted suicide; 86 had been diagnosed as episodic drinkers, 29 as habitual excessive

drinkers, and 11 as addicted to alcohol. Using the Beck Depression Inventory, 38.4% of the males and 37.6% of the females who had an alcohol problem were diagnosed as depressed. In a similar study, Beck, Steer, and McElroy (1982) examined hopelessness, depression, and suicidal behavior in 105 patient admissions to an outpatient mental health alcohol unit. The researchers reported that the 76 men and 29 women in the sample had a mean score in the depressed range on the Beck Depression Inventory. Beck, et al. also found that hopelessness appeared to be a better predictor of suicidal behavior than did depression.

Galanter, Karasu, Plutchik, Conte, and Cohn (1980) examined the affective functioning of 20 inpatient male alcoholics using the Thought Disorder Rating Scale, the SDS, and the Bender-Gestalt. Nineteen of the 20 subjects scored in the depression range on the SDS.

Partington and Johnson (1969) examined 186 male alcoholics using the Differential Personality Inventory and clinical judgements by a psychiatrist, to determine whether there was a unitary alcoholic personality type. Using multiple discriminant analysis, five sub-types of alcoholics were isolated. The largest sub-type, 20% of the sample, was labeled as chronically depressed and anxious. The researchers concluded that a majority of the subjects showed some signs of anxiety, depression, and poor self-image.

After an exhaustive review of the literature on the alcoholic personality, Barnes (1979) concluded that alcoholics generally score higher than non-alcoholics on all standardized depression scales, and depression seems to be a common factor among alcoholics.

Belfer, Shrader, Carroll, and Harmatz (1971) examined personality characteristics in 44 female alcoholics. The MMPI depression scale indicated that the women were significantly more depressed than were women in a "normal" comparison group. The study further concluded that women alcoholics were more depressed than were their male counterparts.

In addition to studies that used standardized instruments, a wealth of clinical data exist supporting the premise that alcoholics are depressed. In a review of psychoanalytic literature on addiction, Brill (1981) described addicts as sharing similar personality characteristics. Among the more prominent of these personality characteristics were depression, anxiety, and weak ego.

In a review of alcoholism, and borderline and narcissistic disorders from a psychoanalytic view, Hartocollis (1980) hypothesized that alcoholics are not diseased individuals, but are a special case of personality disorders. Alcoholism is seen as an attempt to escape pain or depression. The latter was viewed as the prevailing symptom of alcoholism.

Barry (1974) stated that a high proportion of alcoholics have compulsively antisocial, psychopathic personalities or suffer from severe depression with a risk of suicide. Forrest (1975), like Barry, described the characteristics of alcoholics and indicated that depression may be the most important single affective state contributing to general drinking behavior. Forrest hypothesized that many problem drinkers and alcoholics use alcohol as a means for coping with chronic depression. Kissin (1977) also reviewed clinical and experimental findings and reported that alcoholics have high levels of depression. As he stated: "It is a truism that alcoholics cannot cope. They cannot deal with the normal frustrations and irritations of the external world, nor can they deal with anxiety, depression and a sense of inadequacy which swells from within" (p. 316).

Fox (1968) argued for a multidisciplinary approach to alcoholism based on clinical findings with more than 300 patients being treated in her private practice. She stated that "All showed depression with withdrawal, a sense of isolation, extremely low self-esteem, sensitiveness and a masochistic type of self-punishment behavior" (p. 67).

Two points emerge from these studies on alcoholism and depression. There is considerable variablity among studies with regard to the percentage of depressed alcoholics, and, regardless of the instrument used, a high percentage of alcoholics scored in the depressed range. The variation in

alcoholics who are depressed ranged from a low of 8.6% in the study by Keeler et al. (1979) to a high of 95% in the study by Galanter et al. (1980). The 8.6% was obtained using the criteria for depression found in the DSM II. However, the DSM II, because of its poor reliability, was replaced in 1980 by the more reliable DSM III. The Keeler et. al. study, using other instruments on the same sample, found that between 28% and 66% scored in the depressed range. In the Galander et. al. study, the SDS placed 19 of 20 subjects in the depressed range. The SDS was also the most widely used scale.

The second point is most significant for this study. Regardless of the standardized instrument used, depression levels of alcoholics far exceeded those found in the general population. It is estimated that approximately 10% of males and 20% of females in the general population suffer from depression (Newton, 1984).

The review by Barnes (1979) and the clinical observations by Brill (1981), Hartocollis (1980), Forrest (1975), Kissin (1977), and Fox (1968) all supported the hypothesis that depression is common among those suffering from alcoholism.

Alcoholism and Anxiety

The most complete examination of the relationship between alcoholism and anxiety was carried out by Barnes (1979) in his review of the literature supporting the concept of an

alcoholic personality. He stated that alcoholics scored higher than non-alcoholics on the anxiety subscales of all major personality tests including the MMPI, the Eysenck Personality Inventory, and the 16 Personal Factor Questionnaire.

The personalities of 44 alcoholic women were examined by Belfer, Shader, Carroll and Harmatz (1971). Using the Scheier-Cattell Anxiety Battery and the Taylor Manifest Anxiety Scale (TMAS) as dependent measures, the researchers concluded that anxiety levels were significantly higher among their sample than among a "normal" comparison group. The sample of female alcoholics was also more tense than were non-alcoholic wives who accompanied their husbands to treatment.

Kraft and Wijesinghe (1970) examined the anxiety levels of nine alcoholics who were referred for behavior therapy at a clinic in England. The TMAS was administered at entry to, and exit from, treatment. Although significant reductions in anxiety level were noted at exit from treatment, post-treatment scores were still significantly higher than the mean of the standardization sample. The study concluded that alcoholics, as a group, tended to be highly anxious individuals.

Two studies were conducted by Barnes (1980) to examine trait- and state-anxiety levels among alcoholic and non-alcoholic populations. In the first study, 52 men and 22

women alcoholics were administered the Endler Stimulus-Response Inventory of General Trait Anxiousness. A control group consisted of 19 men and 30 women non-alcoholics taking business courses at a nearby technical school. No attempt was made to match subjects, nor to examine pre-group differences. In the second study, 61 men serving short-term sentences in a correctional unit were divided into alcoholic and non-alcoholic groups based on scores on the Michigan Alcoholic Screening Test. Data analysis indicated that alcoholics in both samples scored significantly higher than did non-alcoholics on state-and trait-anxiety levels.

Engstrom and Liebert (1980) matched 74 non-alcoholics patients with 74 alcoholic patients to test whether alcohol ingestion decreases physiological tension and, whether alcoholics and non-alcoholics have significantly different baseline physiological responses when sober. Physiological data were gathered on both groups before and after alcohol consumption using a three-channel electromyograph (EMG) with digital integration. An analysis of the data supported the hypothesis that alcoholics have a higher baseline tension level, as determined by EMG measures, than do non-alcoholics. Alcohol consumption was found to reduce tension levels in both groups. It was concluded that alcohol use is reinforcing to alcoholics because of its tension reduction properties.

Cox (1979) reviewed 15 MMPI studies which were completed between 1959 and 1975, and attempted to isolate a unitary alcoholic personality. He concluded that there is no single personality type among alcoholics, but consistant with non-MMPI studies, alcoholics appear to have some common personality traits. Prevalent among these are anxiety, depression, and poor self-esteem.

Rosenberg and Buttsworth (1969) attempted to differentiate between non-alcoholics and alcoholics using forearm blood flow as an objective measure of level of anxiety. An increase in forearm blood flow is induced by active vasocilation in the muscle. Thirty-five hospitalized alcoholics were randomly selected and matched with a non-random control group of 30 hospital staff-members. Forearm blood flow was measured while the subjects relaxed and again when they tried to solve mental arithmetic problems while being harassed by the experimenters. The mean blood flow was significantly lower for the alcoholic group. It was concluded that non-alcoholics were more concerned with doing well than were alcoholics, who tended to give up easily. It was hypothesized that anxiety among alcoholics may be a general rather than a specific trait.

As with depression, a large body of clinical evidence supports the concept that a large percentage of alcoholics are tense, anxious people.

In his book on the treatment of alcoholism, Kissin (1977) reported that alcoholics are unable to deal effectively with anxiety and urged a multimodal treatment approach. He also reported that alcoholics scored higher than did non-alcoholics on standardized anxiety scales. Kissin's (1977) research was supported by Barry, (1974), and by Forrest (1975), who hypothesized that alcoholism may be developed by highly anxious people in an attempt to sedate themselves. Forrest (1975) further reported on the paradox of alcohol and anxiety; that as alcoholism develops, drinking ceases to control anxiety and becomes anxiety producing. In a review of psychoanalytic treatment of addictions, Brill (1981) reported anxiety to be regarded as a primary characteristic of alcoholism. Fox (1968) agreed with previous findings; and characterized over 300 alcoholic patients seen in private practice in the following way: "Characteristic of all of them was low frustration tolerance and an inability to endure anxiety or tension" (p. 71).

Experimental studies and clinical reports support the hypothesis that alcoholics are highly anxious. Much of the research reviewed compared alcoholics and non-alcoholics on level of anxiety. In the studies conducted by Belfer et. al. (1971), Barnes (1980), Kraft and Wijesinghe (1970), and Engstrom and Liebert (1980), alcoholic populations scored significantly higher than did non-alcoholic populations on

various standardized measures of anxiety. Clinical reports also present the alcoholic as being highly anxious.

Alcoholism and Self-Esteem

Gross and Alder (1971) administered the Tennessee Self-Concept Scale (TSCS) to 140 male alcoholics following detoxification. Alcoholics scored lower than non-alcoholic standardization group on all 10 sub-scales with the exception of self-criticism. They concluded that alcoholics view themselves as generally inadequate and unworthy of respect and that these negative feelings are global rather than limited to a narrow range of personality characteristics.

The discrepancy between the self and the idea-self in alcoholics and non-alcoholics was compared by Carrol and Fuller (1969). Subjects were matched for age, education, IQ, occupation and the Standard Adjective Z-Sort was employed to look at the Self, Ideal-Self discrepancy. The alcoholic group had a significantly greater degree of discrepancy than did the non-alcoholic group.

Gross and Adler (1971) administered the TSCS to 60 male alcoholics at entry and exit from a 60-day inpatient treatment program. With the exception of the social-self subscale, the post-test means for all subscales were closer to those of the standardization sample than were the pre-test means. These results were interpreted to indicate that there was considerable movement toward a positive and healthy view of self as a result of inpatient treatment. The physical-

self and the personal-self sub-scales showed the most significant gains. The TSCS was also used by Felde (1973) in a study 36 alcoholics who voluntarily entered a 90-day treatment program. Pre-test scores were lower than those of the standardization sample on all sub-scales. All post-test scores increased, with the exception of the social-self subscale.

O'Leary, Chaney, and Hudgins (1978) matched four groups on education, age, and social status. The groups were alcoholics entering a nine-week treatment program, alcoholics exiting from the same treatment program, non-alcoholic patients hospitalized for physical illness, and non-alcoholic hospital employees and volunteers. All four groups were administered the TSCS. Alcoholics entering treatment scored lowest on self-concept, followed, sequentially, by alcoholics exiting from treatment, hospitalized non-alcoholic patients, and last, hospital employees and volunteers. The modest gain between entry and exit from the program was taken to indicate that inpatient treatment was associated with improvement in self-concept.

Vanderpool (1969) divided 100 inpatient alcoholics into two groups, both of which completed the TSCS and the Adjective Checklist without alcohol as baseline data. The experimental group then completed the instruments after consuming a controlled amount of alcohol. The base line results indicated that alcoholics had a more negative self-concept than the normative population. The drinking group scored

significantly lower on the second administration, indicating that alcohol consumption does not improve an alcoholics' self-concept but has a negative effect.

As with depression and anxiety, alcoholics seem to differ from non-alcoholics with regard to self-concept. Where depression and anxiety levels seem to be higher for alcoholics, self-concept or self-esteem appears to be lower, even among groups of alcoholics completing treatment.

Alcoholism and Physical Fitness

Research supports the hypothesis that aerobic exercise is an effective treatment of depression, anxiety, and low self-esteem. A review of the literature on alcoholism indicated that alcoholics suffer from higher levels of depression and anxiety and have lower levels of self-esteem than do non-alcoholics. Only a few studies, however, have examined the effect of aerobic exercise on the treatment of alcoholism. Studies that have examined the role of physical fitness in the treatment of alcoholism are reviewed below.

Murphy (1970) examined the effects of a 90-day aerobic fitness program on 89 male alcoholics hospitalized for treatment in a Veterans Administration hospital. Since the purpose of this study was to test whether or not alcoholics could develop aerobic fitness as readily as non-alcoholics, no psychological measures were taken. The following physiological measures were completed on admission to the program and shortly before discharge: a modified sub-maximal step

test, a modified version of the University of Illinois standard test of physical fitness, weight, heart rate, blood pressure, and girth of the expanded chest compared to the relaxed abdomen. The treatment period was one hour per day, beginning with 10 minutes of warm up followed by 10 minutes of light calisthenics. The second half-hour consisted of 15 minutes of strength building and finally a group walk-jog for a distance of one mile. Each subject recorded his own daily work-out levels in terms of the number of repetitions, which were posted on a bulletin board. No effort was made to monitor the intensity of subjects' exercise. Post-treatment data indicated significant changes on all physiological measures with the exception of weight. The study concluded that alcoholics can achieve the beginning of fitness within a relatively short period of time. Although no formal psychological measures were taken, the study concluded that the greatest change seemed to be in how the subjects felt and how they viewed themselves.

Gary and Guthrie (1972) gathered both physiological and psychological data to test the hypothesis that improved physical fitness would lead to improved self-regard in hospitalized alcoholics. Forty male volunteers were randomly assigned to either a treatment or a control group. The treatment group jogged one mile a day for 20 days or until 20 miles was reached. No attempt was made to monitor the intensity of the exercise. Both groups participated in all

other activities assigned as part of ward life. The Gough Adjective Checklist (ACL) and the Jourard Body-Cathexis and Self-Cathexis scales were used as dependent measures. The Schneider Physical Fitness Test was used to determine pre-and-post levels of fitness. All subjects maintained a log of sleeping and drinking behaviors.

Post-treatment analysis indicated that the physical fitness level of the treatment group improved significantly, based on the Schneider Physical Fitness Test scores. Before treatment there had been no significant differences in fitness levels between groups, but following treatment, the exercise group improved from a "poor" rating to an "average" rating. The control group remained in the "poor" category on the Schneider Physical Fitness Test.

Self-Cathexis and Body-Cathexis Scale scores changed in the predicted direction, but only the Self-Cathexis scale improved significantly, indicating higher feelings of self-esteem by the exercise group. Changes in self-concept, as measured by the ACL failed to reach significance, and there were no differences between the exercise group and the control group. An additional finding was that the exercise group reported reduced sleep disturbances. The study concluded that physical fitness training has a place in alcohol-treatment programs both for the physiological benefits and the improvements in self-esteem provided by exercise.

The personality and physiological changes in 214 male inpatient alcoholics as a result of a 12-week exercise program was examined by Frankel and Murphy (1974). The subjects were tested at entry and exit from the program with the MMPI. Physical fitness variables measured were age, weight, systolic blood pressure, diastolic blood pressure, a submaximal step-test and a modified version of the Illinois Standard Test of Physical Fitness. The exercise program consisted of ten minutes of warm-up activities, followed by 15 minutes of strengthening activities. Exercise sessions concluded with 20 minutes of walking or jogging. Exercise frequency was five times a week. The data analysis indicated that as physical fitness improved, MMPI scores changed toward less psychopathology, with decreased anxiety and depression levels showing the most significant changes.

Basketball was used as a mode of aerobic exercise in conditioning inpatient alcoholics in a Japanese study conducted by Tsukue and Shohoji (1981). As part of ward routine, 25 alcoholic patients played basketball one hour a day, three days a week, for 10 months. Because the purpose of the study was to examine the physiological effects of exercise on chronic alcoholics, only subjective psychological data were gathered in the form of nurse evaluations. Physiological measures used to assess changes in physical fitness were an electrocardiogram, a physical examination, a standard physical training test, blood pressure, vital capacity, and

skin-fold measurements. All subjects showed significant changes toward increased physical fitness as measured by all physiological measures. Nurse evaluations indicated that subjects got along better with fellow patients and staff. The study reported increased coordination among subjects and attributed decreased neurological disturbances among subjects to exercise. The study recommended that future studies include standardized psychological assessment as well as physiological measures. Of course, the absence of a control group weakens these findings significantly.

Whiting (1981) examined the effects of a mild exercise program on the psychological treatment of inpatient alcoholics. Subjects were randomly assigned to an experimental (N = 40) and a control group (N = 40). Both groups were administered the STAI, the Locus of Control Scale, and the TSCC at entry and exit. No physiological data were gathered. Both groups participated fully in the treatment center's program. In addition, the experimental group walked two miles a day and engaged in elective exercise in the gym or pool for one hour, five days a week. Post-treatment analysis, after three weeks of exercise, indicated that both groups showed significant improvement in mood, locus of control, and self-concept as a result of inpatient treatment. There were no significant differences, however, between mean scores for the experimental and control groups. Three explanations are offered for these findings: (a) the

control group's exercise level was not monitored, (b) the mode of exercise was not strenuous and no physiological measures were recorded, making it impossible to say that the experimental group was actually in better condition than was the control group, and (c) inpatient treatment had such a large effect on both groups that the benefits of exercise may have been lost. This "treatment-center effect" has been noted elsewhere as a possible confounding variable (Gross & Adler, 1971).

Sinyor, Brown, Rostant, and Seraganian (1982) attempted to answer two questions: Do alcoholics who participate in a graded exercise program show adaptations similar to those seen in non-alcoholics? and does participation in a fitness program while in treatment improve abstinence rates once the alcoholic is discharged from treatment? Participants in the study were 58 inpatient alcoholics; 46 men and 12 women. Two levels of participation were included in the program. Participants who, for a physical reason, could not take part fully in the exercise program, took part at a lower level of intensity. Full participants had individual exercise programs designed for them based on their beginning level of fitness. Intensity, frequency, and duration of exercise were consistent with the guidelines set forth by the American College of Sports Medcine (1980). Exercise sessions were held for one hour, five days a week. Each session consisted of a warm-up, a stimulus period, and a cool-down period. The

low-intensity group and residents at another treatment center were used as controls.

Maximum oxygen-uptake, percentage of body fat, and blood pressure were used to measure changes in physical fitness in the Sinyor et al. (1982) study. Corroborated abstinence reports were gathered on a sample of residents who had received treatment prior to the implementation of the exercise program. The same follow-up evaluation was also conducted on residents at four other treatment centers in the area. The results of these follow-up evaluations were compared with corroborated abstinence reports for the exercise group three months after discharge. Fully-participating subjects showed significant increases on all physical-fitness measures. The lower-intensity group showed some gains, while the residents at the other treatment centers remained unchanged from entry to exit. Abstinence reports collected three months after treatment indicated that residents who participated fully in the exercise program had a 69% abstinence rate, whereas the rate prior to the exercise program had been 36%. Results clearly indicated that regular exercise during inpatient treatment resulted in higher abstinence rates. In contrast to the other studies reviewed, the exercise program in this study was planned carefully to comply with the revised guidelines for setting up an individual exercise program, as detailed by the American College of Sports Medicine (1980).

The findings of these studies support the hypothesis that aerobic exercise has a positive effect on both the psychological and physiological functioning of alcoholics. The physical fitness level of the exercise groups increased in every study which examined pre-post physiological measures. All studies, with the exception of Whiting's (1981), indicated significant positive psychological changes as a result of aerobic exercise. Exercise groups showed increases in self-concept and self-esteem in the study conducted by Gary and Guthrie (1974) and decreased depression and anxiety in the study conducted by Frankel and Murphy (1972). Psychological functioning improved according to subjective nurse reports in Tsukue and Shohoji's (1981) study and length of abstinence was significantly longer for the exercise group in the study by Sinyor, et al. (1982).

Summary

The results of the studies reviewed support the hypothesis that inpatient alcoholics can improve their psychological status as well as physical fitness through exercise. The limited amount of literature on this topic is surprising given these positive findings. Only the Whiting (1981) study failed to find significant differences between exercisers and non-exercisers.

The studies reviewed suffer from several notable weaknesses. Frankel and Murphy (1974), Murphy (1970), and Tsukue and Shohoji (1981) used single group pre-post designs.

Sinyor, et al. (1982) used alternative treatment center populations as control groups. Only the studies conducted by Whiting (1981) and Gary and Guthrie (1972) assigned subjects randomly to treatment and control groups Random assignment in an inpatient setting might not ensure internal validity, due to the generally small population and the amount of interaction between the experimental and control groups. Whiting (1981), and Gary and Guthrie (1972) did not monitor the level of exercise undertaken by the control group and did not address subject-control interaction as a possible confounding factor.

These studies also involved poorly designed exercise programs. The American College of Sports Medicine (1980) detailed specific guidelines for designing individual exercise programs. The elements of a good exercise program are intensity of exercise, duration of exercise, and frequency of exercise. Intensity must be at a level of between 60 and 80 percent of maximum heart-rate in order to achieve aerobic benefits. Duration of exercise must increase gradually to ensure increases in aerobic fitness, with 20 minutes being a minimum and between 30 and 45 minutes being optimal. Frequency should be a minimum of three-days a week. Also exercise sessions should contain a warm-up period to prepare the body for work, a work or stimulus period, and a cool-down period during which the body gradually returns to its pre-exercise state. Only Sinyor et al. (1982) included

these elements in their exercise program. The remaining studies had participants exercise five days a week for one hour each day, satisfying the American College of Sports Medicine's requirement for duration and frequency. However, because intensity levels were not monitored, it is impossible to know whether the subjects worked hard enough to achieve aerobic benefits.

There is need for further study which combines an examination of psychological and physiological measures that occur as a result of a carefully planned and monitored exercise program based on the best scientific principles currently available. Also, as discussed previously in this proposal, random assignment may not be the best method of structuring an experiment of this type due to the nature of inpatient alcoholism treatment. There is a need for further study using alternate research designs which attempt to protect the internal validity of the experiment.

Chapter III

METHODOLOGY

This chapter will discuss the research setting, the research design, and the dependent measures used, and will detail how the exercise program was designed and implemented.

Research Setting

This study was conducted at Fellowship Hall, a private non-profit hospital for the treatment of alcoholism. The hospital is located on the outskirts of Greensboro, North Carolina, which has a population of approximately 160,000 people. It has treated more than 5,000 alcoholics and their families during its 12-year history. Although the majority of admissions are from Virginia, North Carolina, and South Carolina, admissions from other parts of the country are not uncommon. Maximum capacity is 48 patients, and the cost for the hospital's 28-day program is approximately $3000.00.

Fellowship Hall is governed by a board of directors, whose policies are carried out by an executive director. Under the executive director's supervision is the medical director, a physician, and the clinical director, who is the head counselor. The remaining staff is composed of 12 nurses, 15 counselors, and 28 administrative, clerical, or other support personnel.

Fellowship Hall's treatment program includes detoxification services, alcohol education, family education, individual therapy, group therapy, Alcoholic's Anonymous

meetings, and an optional recreational program consisting of unstructured, informal basketball and volleyball games. The first week of treatment includes detoxification, 11 orientation classes designed to aid the patient in accepting the disease concept of alcoholism, and three to four individual-counseling sessions with one of the hospital's counselors. At the completion of the first week, a patient begins attending a series of 32 intermediate therapy lectures designed to present the fundamentals of recovery, attends daily group-therapy sessions, continues to meet three or four times a week for individual counseling, and attends daily Alcoholic's Anonymous meetings. During the third week of treatment, the patient continues with the activities begun in the second week and attends additional family-therapy and family-education sessions with his or her family or significant others. During the last week of treatment, the patient continues with the intermediate-therapy lectures, group and individual counseling, and Alcoholic's Anonymous meetings. In addition, he or she attends a discharge group designed to assist the patient in coping without alcohol after leaving Fellowship Hall.

Research Design

This study utilized a two-group pre-post design with non-random assignment of subjects to groups. Random selection and random assignment of subjects generally is considered the best method for ensuring internal validity

(Isaac & Micheal, 1981) in an experimental research study. However, randomization was neither feasible nor desirable in this study, due to the highly regimented nature of inpatient treatment at Fellowship Hall and the small treatment population. The residents at Fellowship Hall attend classes, groups, and meals together and share living quarters. Randomization would not have ensured internal validity because of the amount of interaction that would have likely occurred between control and exercise-group members. To avoid any possible confounding, control-group data were gathered prior to the recruitment of the exercise group and the implementation of an exercise program. Recruitment for the exercise group was not started until the last control group member was discharged from treatment.

Control Group. Control-group data collection was begun on September 19, 1984 and completed on November 17, 1984. Thirty-five consecutively admitted patients, who had been approved for recreation, constituted the control group. Four subjects failed to complete pre-testing and five left the hospital without completing post-testing, yielding a control group of 26 subjects; seven white females, two black males, and 17 white males. Mean age for the control group was 38.88 years.

Treatment Group. After the last member of the control group was discharged, recruitment of the treatment group was

begun. Treatment group pre-testing began on November 20, 1984, and post-testing was completed on Febuary 5, 1985.

Thirty-nine consecutively admitted patients were included in the treatment group. However, two subjects dropped out without completing pre-testing, five were discharged without completing post-testing, four were dropped from the study because they did not exercise, and one subject was transferred to another facility. Of the 27 remaining subjects, nine were white females, two were black males, and 16 were white males. The mean age for the exercise group was 35.62 years.

Instruments

The following instruments were used as pre-post dependent measures.

Zung Self-Rating Depression Scale (SDS). The Zung Self-Rating Depression Scale is a short, self-rating, easy-to-administer scale that measures the presence and severity of depression (Zung, 1965, 1981). The SDS has been translated into 30 languages and has been used as a dependent measure in over 300 studies (Zung, 1973).

In the research reviewed in Chapter II, SDS was the most frequently used depression scale. Brown, Ramirez, and Taub (1978), Blue (1979), and Morgan, Roberts, Brand, and Feinerman (1970) used the SDS to measure depression levels in non-alcoholics, while Cox, Weingold, Lachin, and Bell,

(1978), and Galanter, Karasu, Plutchik, Conte, and Cohn, (1980) used the SDS to measure depression in alcoholics.

Split-half reliability coefficients corrected through the Spearman-Brown formula were reported to be 0.73 for the SDS (Zung, 1973). The validity of the SDS, as examined by Biggs, Wylie, and Ziegler (1978), found a Spearman rank-correlation coefficient of 0.80 between the SDS and the widely-used Hamilton Rating Scale for Depression (Hamilton, 1960). In the same study, Spearman a rank-correlation coefficient between the SDS and the depression ratings by physicians was reported to be 0.69. As further evidence of validity, Zung (1973) presented data indicating that the SDS consistently discriminated between depressed and non-depressed patients.

The SDS consists of 20 items, half of which are worded symptomatically negative, and the other half symptomatically positive. There are four quantitative choices for each item, ranging from "a little of the time" (assigned a value of one) to "most of the time" (assigned a value of four). The scale is constructed so that the more a subject is depressed, the higher is the score. Scores range from a minimum of 20 for subjects who answered all items with "a little of the time", to a maximum of 80 for subjects who answered all items with "most of the time". The SDS takes between five and 15 minutes to complete.

Spielberger State-Trait Anxiety Inventory (STAI). The STAI was developed by Spielberger (1984), to assess both chronic anxiety patterns (trait anxiety) and acute transient anxiety (state anxiety). The standardization group consisted of approximately 6,000 high-school and college students, 600 psychiatric and medical patients, and 200 prison inmates.

The STAI is self-administered and consists of two 20-item scales; one assesses trait anxiety and the other assesses state anxiety. There is no time limit, but both scales are generally completed in 10 to 20 minutes. Scores range from a low of 20 to a maximum of 80.

Spielberger (1984) reported that test-retest reliability for the trait-state anxiety scale ranged between 0.73 and 0.86 for college students, with the mean being 0.76. Because of the nature of state anxiety, reliability coefficients were much lower for this scale, ranging from 0.16 to 0.62, with the median test-retest reliability coefficient being 0.33. Spielberger (1984) suggested that alpha coefficients provide a more meaningful index of reliability because of the fluctuations in state anxiety. Computed alpha coefficients using Formula KR-20 as modified by Cronbach (1951), were reported to be 0.93 for the standardization sample.

Construct validity for the STAI was examined by using the contrasting-groups method (Spielberger, 1984). The trait-anxiety scores of neuropsychiatric patients were compared to those of normal patients, with the neuropsychiatric

patients scoring higher in all but one group. Construct validity was further examined by comparing military recruits involved in stressful training, with similarly-aged high-school and college students who were tested under non-stressful situations. The recruits had significantly higher scores (Spielberger, 1984).

Concurrent validity was examined by correlating the STAI with other well-known standardized anxiety scales (Spielberger, 1984). The correlation between the Taylor Manifest Anxiety Score (Taylor, 1953) and the STAI was 0.83 for neuropsychiatric patients, 0.80 for college females, and 0.79 for college males. The correlation between the STAI and the IPAT Anxiety Scale (Cattell & Scheier, 1963) was 0.75 for college females, 0.76 for college males, and 0.77 for neuro-psychiatric patients.

The STAI has been widely used in research as a dependent measure. Of the 150 references reviewed by Smith and Lay (1974), the STAI was used in 108 studies related to anxiety. Spielberger (1984) published The State-Trait Anxiety Inventory: A Comprehensive Bibliography, in which more than 2,000 publications were cited that used the STAI to measure anxiety.

Tennessee Self-Concept Scale (TSCS). The TSCS (Fitts, 1965) is one of the most widely used instruments in self-concept research. It was developed to provide researchers and clinicians with a simple, widely applicable, well

standardized, and multidimensional description of self-concept (Fitts, 1965). The standardization group of 626 people ranged in age from 12 to 68, had varying educational backgrounds that ranged from completing sixth grade to having a doctorate, and was composed of approximately 50% males and 50% females. Although obtained mainly from high school and college classes, the standardization group also included employees at state institutions and various other sources (Fitts, 1965).

The TSCS consists of 100 self-descriptive items in a five-point Likert-type scale. Ninety items were used to develop an overall self-concept rating (i.e., P score), and several sub-scales concern various aspects of self concept (e.g., social self and physical self). The ten remaining items, taken from the L-scale of the MMPI, are used to detect subject defensiveness. The item pool was developed by using items from earlier self-concept measures.

Fitts (1965) reported a test-retest reliability of 0.92 with 60 college students over a two week period. Evidence of validity was presented in several ways. Seven psychologists had to unanimously agree about the inclusion of an item before it was used. Evidence was presented that the TSCS discriminated between psychiatric and non-psychiatric patients, and delinquents and non-delinquents. Various analyses indicated that the TSCS sub-scales compare in a predictable manner to similar sub-scales on the MMPI. More

than 450 published research studies that used the TSCS are reported in the Tennessee Self-Concept Scale Bibliography of Research Studies (Fitts, 1973). Also, Chapter II of this study reviewed numerous articles that used the TSCS to assess change in self-concept.

The TSCS is available in a counseling form, as well as a clinical and research form. The counseling form, which was used in this study, takes between 10 and 30 minutes to complete (Fitts, 1965). The P-score, representing an overall level of self-esteem, was used.

The TSCS was approved for use at Fellowship Hall by the administrative director. However, when data were collected, some of the center staff members questioned the instrument's appropriateness. They identified 12 items which they believed were inconsistent with Fellowship Hall's treatment philosophy and would be potentially damaging to the low self-esteem of subjects who took the instrument during their first week of treatment. Because of the opposition to the TSCS, the researcher had the choice of removing the 12 items (see Appendix A) or removing the instrument as a dependent measure. The 12 items were removed. It was felt that the TSCS would provide appropriate comparisons between groups even though the standardization norms would no longer be applicable. The 12 omitted items were coded with the neutral response of choice C, "partly true, partly false", as recommended in the manual for missing data (Fitts, 1965).

Estimated Maximum Oxygen Uptake. Aerobic fitness was measured by a single six-minute sub-maximal Monark bicycle ergometer test. This procedure was developed by Astrand and Ryhming (1954) to estimate maximum oxygen uptake (VO2 max) in applied research settings where more elaborate laboratory equipment is not available. The correlation coefficient between actual VO2 max and estimated VO2 max, as predicted by the Astrand-Ryhming procedure, was 0.74 with a standard error of plus or minus 15 percent for untrained individuals (Astrand & Rodahl, 1977). Data collection took place between two and four p.m. on week-days. Subjects were instructed to wear comfortable clothes and tennis shoes, to refrain from smoking for at least two hours before testing, and to not eat within one hour prior to testing. Testing time was two hours after meals, long enough to insure that subjects did not eat prior to testing. However, subjects' smoking behavior prior to testing was impossible to monitor.

Procedures

Data Collection and Testing

All admissions were screened by the staff physician and, based on the patient's physical condition, were either approved or denied permission to participate in recreational activities. No recreational activities were allowed during the first week of treatment.

Admissions who had been approved for recreational activities were informed by the investigator during their

first week of treatment, that a study was being conducted which would require them, if they volunteered to participate, to complete a physical-stress test and approximately 40 minutes of self-report instruments during their first and last week of treatment. They were also informed that they would be debriefed on the nature of the study following post-testing, and that they could drop out at any time they chose. Those agreeing to participate signed a consent form (see Appendix B), and testing was scheduled.

Subjects were given individual instructions on how to complete the SDS, the STAI, and the TSCS. They were allowed to complete them in their rooms and to return them to the researcher the next day. For the bicycle ergometer test, the subject's weight in kilograms was recorded on the data-recording form (Appendix C). The test procedure was explained and any questions or concerns were addressed. The Monark bicycle-ergometer seat was adjusted so that a subject's knee was slightly bent when the pedal was at its lowest point. The resistance indicator was set at no-resistance, zero-work load. An acoustical and visual metronome was used to establish the pedal cadence at 50 pedal revolutions per minute.

Subjects pedaled for one minute, or until they were comfortable with the pedal cadence, before gradually increasing the work load to one kilogram. A subject's heart rate was monitored during the last 15 seconds of each minute

using a Casio digital stop-watch and recorded on the data-recording form. Pre-and-post heart rates were taken on all subjects by the same examiner. If the heart rate did not approach the 120 beats per minute need, i to ensure an accurate test, the work load was increased at the end of the second minute and the procedure was extended to seven minutes. The poor physical condition of most subjects made increasing the work load generally unnecessary. The mean of the heart rates taken during the last two minutes of the procedure, and the work load were used to estimate VO2 max by using the table developed by Astrand (1960), and were adjusted for age and weight using Astrand's (1960) formula.

The Exercise Program.

The exercise program, comprised of walking and or jogging, was required, not only of the experimental group, but of all persons at Fellowship Hall. It was designed to meet the minimum requirements for intensity, frequency, and duration as proposed by the American College Of Sports Medicine (American College of Sports Medicine).

Intensity. To achieve optimal aerobic benefits, exercise should raise the heart rate to between 60% and 80% of an estimated maximum (American College of Sports Medicine, 1980). The intensity level of exercise was determined for subjects by subtracting each subject's age from an estimated maximum heart rate of 220, and multiplying that number by .60 and .80 (Cooper, 1978; American College of Sports Medicine,

1980). This range of 60 to 80 percent of estimated maximum heart rate was recorded for each subject on that individual's exercise sheet (see Appendix D). Each subject was also trained to monitor his or her own heart rate. The intensity of exercise was determined for subjects by how fast they had to walk or jog to raise their respective heart rate to their target range. For safety purposes, emphasis was placed on staying within the prescribed heart-rate range. The majority of subjects were able to reach and maintain their respective target heart-rate range by brisk walking.

Frequency. Exercise was conducted on Tuesday, Thursday, and Saturday afternoons from four o'clock to five o'cock. The minimum number of sessions necessary to insure adequate aerobic training is three times a week (American College of Sports Medicine, 1980).

Duration. Exercise began with 20 minutes of walking or jogging, the minimum requirement necessary to insure aerobic training (American College of Sports Medicine, 1980). The exercise was increased to 25 to 30 minutes by the fourth week.

Exercise Treatment Plan. Each session was divided into the three essential components for a good exercise program: warm-up, stimulus, and cool-down (American College of Sports Medicine, 1980). The exercise group met on an outdoor basketball court, when weather permitted, for warm-up and for cool-down. If the weather was below freezing or if it was

raining, these activities took place indoors in a large lounge. Each session began with approximately 10 minutes of warm-up; muscle stretching and strength-building exercises. The warm-up routine was flexible, but included exercises to stretch all of the major muscle groups: neck-rolls, followed by shoulder shugs, trunk rotations, static stretches of the thighs and calves, and ankle-rolls. If time permitted, sit-ups and modified push-ups followed.

Following warm-up, a pre-stimulus heart rate was taken and the exercise group walked or jogged around a circular wooded path which was approximately eight-tenths of a mile long. Heart rates were monitored at least two times per session to ensure proper intensity. During the first week of exercise, some of the most deconditioned subjects walked only one lap. However, by the third week all subjects completed two laps. Duration ranged from 28 to 30 minutes for slow walkers to approximately 18 to 20 minutes for fast joggers.

When the exercisers finished the stimulus period of walking or jogging, they completed the cool-down session, which consisted of repeating the warm-up exercises under the supervision of one of the exercise leaders. Cool-down was continued until each exerciser's heart rate returned to a pre-exercise level. Both the warm-up and cool-down sessions were used to teach participants proper exercise techniques.

Exercise Instructors. Exercise sessions were lead by two females. One was a 24-year-old college graduate with

extensive experience as an aerobics instructor. She was responsible for leading the warm-up and cool-down exercises and explaining the purposes of both to exercisers. Her assistant was an undergraduate psychology major who was active in aerobics. The usual procedure was for the exercise leader to lead the group around the trail, staying with the fast exercisers. The assistant walked with the slow exercisers. Both had Cardiovascular Pulmonary Resuscitation certification and had received college credit in first-aid training.

Chapter IV will examine the results of statistical analyses of the data.

Chapter IV

RESULTS

The STAI, SDS, TSCS, and Astrand-Rhyming bicycle ergometer test were administered both at the beginning and the end of the treatment period to a control and an experimental group of inpatient alcoholics. The results of various data analyses are presented in this chapter. Descriptive information is reported for the control and exercise groups, followed by the results of students' t-tests, used to examine the groups for pre-existing differences, and the results of multivariate analytic procedures.

Group Characteristics

Table 1 presents descriptive statistics for 53 subjects; 26 control-group members and 27 exercise-group members. Although all subjects were asked to complete an optional personal data sheet (see Appendix E), some chose not to answer questions about prior drinking history, religion, and income. Demographic information on those who did answer is presented below.

Insert Table 1 about here

Eleven control-group subjects were married, six were divorced or separated, and six were single. In the exercise group, nine were married, eight were divorced or separated, and 13 were single. The control group was composed of 14 Protestants, and one individual with no religious preference, whereas the exercise group had 15 Protestants, one Catholic,

and three individuals with no religious preference. Sixteen control-group subjects reported another drinking problem in their immediate family (e.g., parent, sibling, aunt, or uncle) and 21 subjects in the exercise group reported having a family member with a drinking problem.

Occupations were diverse, ranging from an executive to unskilled laborers. Of the 21 control-group members who listed their occupation, 12 worked in white-collar positions and nine in blue-collar jobs. In the exercise group, 17 reported their occupation; seven worked in white-collar positions, and 10 in blue-collar jobs. A frequency distribution of subject's occupation is included in Appendix F.

Group Equivalence

To test for group equivalence, a series of t-tests was conducted on group means for all five dependent measures. The alpha level was set at .10 for each t-test, in an attempt to protect against falsely retaining the null hypothesis of no pre-existing group differences; a Type II error was of primary concern. Table 2 summarizes the results of these t-tests. No significant differences were found between the exercise and control groups on any of the pre-test measures.

Insert Table 2 about here

Multivariate Analyses

Because no pre-existing group differences were found, pre-treatment group equivalence was assumed and a multivariate Hotelling's T^2 procedure was conducted on post-test scores using the General Linear Models (GLM) program of the Statistical Analysis System (SAS) computer package (Ray, 1982). If the pre-test means had been significantly different, they would have been used as covariates and a multivariate analysis of covariance procedure would have been used. The multivariate analysis was conducted using the data for 50 subjects. Three members of the control group attempted, but failed, to complete post-testing on the bicycle ergometer, and multivariate analysis requires complete sets of data on each subject (Ray, 1982). The multivariate T^2 procedure allowed for simultaneous testing of all five dependent measures with consideration of the interrelationships that existed among them (Finn, 1974; Timm, 1975). The Hotelling-Lawley Trace, a special case of Wilks' Lambda for two groups, was used to test for overall significance. This procedure produced a significant F-ratio of 3.27 ($p<.05$ with 5 and 44 degrees of freedom). The hypothesis that the exercise and control groups had equal mean vectors on the dependent variables was rejected; together the five dependent measures (i.e., state anxiety, trait anxiety, depression, self-concept and post VO2 max) showed a significantly multivariate effect.

When the multivariate significance test supports rejection of the null hypothesis of equal mean vectors, it is appropriate to examine the univariate F-ratios for each dependent variable in order to isolate treatment effects (Cooley & Lohner, 1971; Finn, 1974). Timm (1975), however, recommended a more conservative approach to decrease the probability of falsely rejecting the null hypothesis. Each dependent measure's F-ratio is tested at an alpha level such that the sum of the individual alpha levels equal the desired experiment-wise alpha level. This procedure was used to analyze the effects of the treatment (i.e. exercise) on the five dependent measures. Each dependent variable was tested at an alpha level of .01, thus ensuring that the experiment-wise level would remain at an acceptable value of .05.

The F-ratios for each dependent variable are summarized in Table 3. There were significant differences in mean post-test scores between the control group and exercise group on three of the five dependent measures: state anxiety as measured by the STAI, trait anxiety as measured by the STAI, and depression as measured by the SDS. Mean diff. in self-concept, as measured by the TSCS were not significant at the .01 level ($p > .0502$). The mean difference between the experimental group and the control group on VO2 max was not

statically significant at the .01 level, indicating no difference in mean fitness levels between the exercise and control groups.

Insert Table 3 about here

Results of each dependent variable are discussed below in more detail. Table 4 presents a summary of pre-post means and standard-deviations for each dependent variable, by group.

Insert Table 4 about here

Descriptive Statistical Results

STAI Scores. From the data analyses, it was concluded that alcoholics who exercised while in treatment had significantly lower STAI scores than did alcoholics who did not exercise while in treatment. The exercise group's state-anxiety scores decreased from 47.40 at pre-testing to 27.88 at post-testing. The control group's state-anxiety scores also decreased from 52.69 at pre-testing, to 38.42 at post-testing. Trait anxiety decreased from 48.03 at pre-testing to 32.18 at post-testing for the exercise group, and from 51.69 at pre-testing to 42.92 at post-testing for the control group.

Self-Rating Depression Scale. The hypothesis that alcoholics who exercise while in treatment would show significantly larger decreases on the SDS than would alcoholics who do not exercise while in treatment, was accepted. The

exercise group's pre-test SDS raw score was 42.18 and post-test SDS raw score was 30.00. For the control group, the pre-test raw score was 44.00, and post-test raw score was 37.76. Although both groups scored in the mild-to-moderate depression range on pre-testing, they were out of the depression range at the time of post-testing.

TSCS scores. The hypothesis that self-concept as measured by the TSCS, would be significantly higher for alcoholics who exercise while in treatment than for those who do not exercise while in treatment, was rejected. The exercise group's scores increased from 300.70 at pre-testing to 331.85 at post-testing, while the control group's scores increased from 288.23 at pre-testing to 310.53 at post-testing. Higher scores indicate better self-concept. There was a significant mean post-test difference between the groups at the .05 level, but not at the .01 level.

Estimated VO2 max. The hypothesis that alcoholics who exercise while in treatment would experience significantly larger physiological changes, as measured by the Astrand-Rhyming bicycle-ergometer test, than would alcoholics who do not exercise, was rejected. The exercise group changed in the predicted direction from a pre-test mean of 29.63 ml/liters per minute to a post-test mean of 34.08 ml/liters per minute. The control group, however, decreased from a pre-test mean of 32.7 ml/liters per minute to a post-test mean of 29.61 ml/liters per minute. Three control-group subjects, who

successfully completed the pre-testing, were unable to complete the post-testing.

A factor which may have effected the results of the Astrand-Rhyming test was smoking. Although subjects were specifically requested not to smoke for at least one hour prior to testing, it was impossible to monitor this behavior. Subjects came to testing directly after classes or gorups where smoking was allowed. Smoking can have a negative effect on test results (Astrnad & Rodahl, 1977). Future studies should attempt to control smoking behavior prior to testing.

The results of these analyses will be discussed in Chapter V. Conclusions, implications, recommendations, and limitations will be presented.

CHAPTER V

DISCUSSION

The purpose of this study was to examine the usefulness of aerobic exercise as a treatment intervention with adult inpatient alcoholics. Standardized instruments measuring anxiety, depression, self-concept, and VO2 maximum were administered to a treatment group and a control group on admission, and again at discharge, from a 28-day treatment program. Both groups participated fully in the treatment program; in addition, the treatment group completed a structured walking and jogging program three times a week.

The results of this study indicate that aerobic exercise, when incorporated into an inpatient alcohol-treatment program, leads to improvements in STAI scores and SDS scores, but not in TSCS scores or VO2 max levels. The remainder of this chapter consists of a discussion of each dependent variable, the implications of the study, the limitations of the study, and recommendations and conclusions drawn from the findings of the study.

Depression

On average, alcoholics who were members of the exercise group showed greater changes between pre and post testing on the SDS than did alcoholics who were in the no-exercise control group. These findings are consistent with the results of Frankel and Murphy (1974), who found 214 male alcoholics to be less depressed following 10 weeks of exercise.

The findings of this study pertaining to depression are also similar to those of the research reviewed in Chapter II, which indicated that aerobic exercise is effective in reducing depression among non-alcoholic populations (Blue, 1979; Brown, Ramirez, & Taub, 1978; Greist, Klein, Eischens, Faris, Gurman & Morgan, 1979).

Anxiety

Mean post-test anxiety levels, as measured by the STAI, were significantly lower on both state and trait anxiety for alcoholics in the exercise group than for alcoholics in the control group. This result is consistent with the findings of Frankel and Murphy (1974), who used the MMPI to examine pre-post changes in 214 male alcoholics following 10 weeks of exercise. However, the results are not consistent with the findings of Whiting (1981), who concluded that there were no differences in anxiety level between alcoholics who exercised and alcoholics in a control group who did not exercise. Whiting made no attempt to monitor the intensity of exercise; as previously discussed in this study, intensity needs to be between 60% and 80% of an estimated maximum heart rate to ensure optimal aerobic benefits. The results of this study regarding the role of exercise in anxiety control are similar to those reviewed in Chapter II; as indicated, aerobic exercise decreased anxiety levels among non-alcoholic populations (Bahrke & Morgan, 1978; Lion, 1978; Young & Ismail, 1976).

Self-Concept

The mean post-test difference between the experimental and control groups in self-concept, as measured by the TSCS, was significant at the .05 level. But to maintain an acceptable experiment-wide alpha level, an alpha level of .01 was used to examine each dependent measure's F-ratio. Therefore, no significant difference on this variable was found between alcoholics who exercised and those who did not. This finding is consistent with the research of Whiting (1981), but differs from results reprted by Collingwood, (1972), Berger, (1980), and Jasnoski, Holmes, Solomon and Aquiar, (1981), who found that exercise had a significantly positive effect on self-concept. The lack of a signifcant difference at the .01 level may be due to the neutral coding of 12 items on the TSCS.

VO2 Max

Mean post-test scores on VO2 max did not approach between-group significance in this study. In contrast, significant increases in physical fitness as a result of regular aerobic exercise were found by Murphy (1970), Frankel and Murphy (1974), and Tsukue and Shohoji (198). However, their studies were conducted over more extended periods of time than the present study, which was only four weeks in duration. Physiological changes generally take 9 to 12 weeks to manifest themselves (Dishman, 1980). In the present study, the exercise group's mean VO2 max score changed in the

predicted direction, whereas the control group's mean score actually decreased as a result of inactivity in the treatment center. Also, three control-group members sucessfully completed the pre-testing, but were unable to complete post-testing, indicating that their physical fitness level decreased from admission to discharge. From these results, it seems that a longer treatment period might have led to significant differences between groups on VO2 max.

Implications

Implications for Treatment

The findings of this study indicate that regular aerobic exercise could be a helpful part of inpatient alcohol treatment programs. The purpose of inpatient treatment is to help the alcoholic develop new behavior patterns that will allow him or her to live comfortably as a non-drinker (Rothrock, 1984). Inpatient programs, such as that provided by Fellowship Hall, use a variety of methods to equip the alcoholic with the skills needed to develop an alcohol-free lifestyle. Using exercise as a method can be a valuable tool for the recovering alcoholic. The alcoholics in this study who participated in the exercise program while in treatment were, when discharged, less anxious and less depressed than were alcoholics in the no-exercise control group and, therefore, should be in a better position to cope with post-discharge problems.

As with other "tools" provided by the treatment center, there is no guarantee that exercise will be continued once the alcoholic is discharged, but, for those who do continue, exercise could be a useful method for structuring time. Alcoholics, in many cases, build their lives around drinking situations. It would appear that, when alcohol is no longer an option, they would have few alternative time-structuring methods available. The counselors at Fellowship Hall, recognizing this problem, urged recovering alcoholics to "change their playgrounds and playmates" when discharged, and emphasized regular attendance at Alcoholics Anonymous meetings where the new non-drinker is able to associate with other non-drinkers. Exercise, if incorporated into the recovering alcoholic's lifestyle, could provide another healthy way of structuring time without alcohol. Glasser (1975) reported in his book Positive Addiction, that healthy habits such as exercise can replace negative addictions such as excessive drinking.

If inpatient treatment programs incorporate exercise into treatment, the chances of having a successful program would be improved if the exercise was mandatory for all in treatment. The alcoholics in this study were poorly conditioned, unaccustomed to mild exercise, and not always willing subjects. Inpatient treatment at Fellowship Hall was highly structured, allowing only one hour per day of free time, which on Tuesday, Thursday, and Saturday, was designated for

exercise. Many subjects would have preferred to play pool, watch television, rest, or catch up on assigned reading, rather than exercise. The leaders often had to be insistent that subjects attend exercise sessions. On several occasions, some of the less willing would hide in their rooms to avoid participation. Others complained of exercise "injuries" due to walking or jogging, when the injury could only have been received by playing contact sports.

It would seem that the problem of compliance with exercise expectations could be partially overcome if administrators had a commitment to, and a belief in, the usefulness of exercise. Participation in exercise should be stressed from the time of admission; not as an option, but as an important element of treatment, with the same status as other treatment techniques such as individual or group counseling. To achieve this commitment, extensive staff training is needed, with the staff being permitted as much discretion input as possible in planning and implementing an exercise program.

The cost of implementing a program similar to the one used in this study would be minimal, requiring no expensive equipment and no special skills on the part of the participants. The main expense incurred would be the hiring of personnel to direct the program. If all other staff members were active in the program, one additional full-time staff person, or possibly a half-time person, would be adequate. The person(s) hired should have a basic understanding of

exercise principles, have knowledge of first aid, be physically fit and, most important, be a good motivator(s) who believe in the usefulness of exercise.

Implications for Counselor Preparation

The information provided from the results of this study has implications for the training and preparation of counselors, psychologists, and other helping professionals. Traditional training programs acknowledge the importance of examining the "whole person", yet most stress cognitive, insight-oriented methods of treating emotional problems. The relationship between physical and mental functioning could be included as part of a basic theories course or a seminar developed for students that examines the role lifestyle plays in maintaining good physical and emotional health.

Implications for Research

The information provided from the results of this study has implications for counselor research. Whether or not a particular treatment method is considered successful often depends on subjective clinical intuition, not scientific data generated from a study with a controlled treatment. Counselors and other helping professionals should strive to evaluate the outcome of new treatment techniques using the most rigourous evaluation methods possible. Controlled evaluation of therapeutic outcomes will allow counselors to select appropriate interventions for client change with greater certainty. Another implication for research might be

the concept of using physical well-being as a dependent measure. Like many psychological constructs, physical changes can be measured in an objective manner.

Limitations

Certain limitations within this study could affect the generalization of results.

Treatment Population

The subjects in this study were primarily middle to upper-middle class in socioeconomic status, were well educated, and possibly were already aware of the perceived benefits of exercise as presented by the popular media. The middle-class subjects in this study may have improved because they were aware that exercise is often thought to have positive effects. Replications of this study are needed with lower socioeconomic-class alcoholics, adolescent alcoholics, or other special treatment populations who are less aware of the current national obsession with physical fitness.

Length of Treatment

Fellowship Hall's treatment program was only 28 days in duration, and did not permit exercise during the first week of treatment. The human body adapts slowly to exercise, with physiological changes occurring 9 to 12 weeks after beginning a regular exercise program (Falls, Dishman, & Baylor, 1980). It is not surprising that there were no significant physiological differences between the exercise and control groups following only nine exercise sessions over a three-week

period. The short treatment period should be taken into account when comparing the results of this study with other research examining the effects of exercise. Perhaps most surprising is that psychological changes preceded physiological changes.

Evaluation

All standardized instruments used in this study were approved by the administrative staff and the clinical staff at Fellowship Hall. However, a problem with the use of the TSCS almost terminated the study. Some members of the staff questioned 12 of the items on the instrument, believing them to be at variance with the Center's treatment philosophy. To continue with the data collection, the 12 items were deleted and the neutral response score was assigned to each. Thus, comparisons between the subjects in this study and the TSCS standardization norms were not possible. Athough the TSCS was used to compare the two groups, coding 12 items out of 100 with a neutral response may have reduced the variability of both sets of scores.

Recommendations

Based on the results of this study, the following recommendations for future research are offered.

Length of Treatment

A longer exercise program than was possible in this study would permit examination of relationships between increasing fitness and psychological functioning; longer

treatment would permit an evaluation of whether alcoholics who show the largest physiological changes as a result of exercise also show the largest psychological changes.

Follow Up

Inpatient alcoholism treatment provides the alcoholic with "tools" to assist in building an alcohol-free lifestyle, and success should be measured by how well these tools are used once the alcoholic is discharged. The question that needs to be asked is whether exercise has any long-range effect on an alcoholic's recovery? This study did not examine post-discharge differences between those who exercised and those who did not, but this question should be addressed in future research.

Evaluation

There appeared to be a distrust of evaluation by some counselors at Fellowship Hall, particularily evaluation which used standardized psychological tests. Although evaluation should be an important part of an exercise program, efforts should be made to use dependent measures that are non-threatening and unobtrusive, such as behavioral check-lists and self-reports. Careful initial planning and early staff involvement in choosing dependent measures should be undertaken to prevent possible misunderstandings similar to the one that arose in this study concerning use of the TSCS.

Conclusions

This study examined the relationship between aerobic exercise and improved psychological functioning in a sample of inpatient adult alcoholics. The results were promising; after three weeks of moderate exercise for one hour a day, three days a week, improvements in depression and anxiety occurred. This study represents a new and innovative approach to the treatment of alcoholism that merits further consideration and research.

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TABLE 1

Table 1

Summary of Socio-Demographic Statistics, by Group

	Control Group (N = 26)				Exercise Group (N = 27)			
Variable	N	Mean	SD	Range	N	Mean	SD	Range
Age	26	38.88	10.84	20 to 57	27	35.62	13.75	18 to 71
Education in years	23	13.91	3.02	8 to 20	26	13.03	2.40	7 to 17
Drinking problem in years	21	7.33	3.16	3 to 15	21	9.76	6.96	3 to 35
Income in 1000's	15	27.80	14.38	8 to 55	13	20.15	11.96	7 to 55
Prior alcohol hospitalization (number of times)	23	1.52	2.12	0 to 7	25	1.0	1.44	0 to 5
Prior alcohol arrest (number of times)	23	1.52	1.92	0 to 8	25	1.72	3.14	0 to 15

TABLE 2

Table 2

T-test Results Between Group Means on Pre-test Scores

	Control (N = 26)		Exercise (N = 27)		
Variable	Mean	SD	Mean	SD	t[a]
STAI State anxiety scores	52.69	14.21	47.40	12.09	1.45
STAI Trait anxiety scores	51.69	11.22	48.03	9.33	1.29
SDS score	44.03	11.75	42.18	8.12	.67
TSCS scores	288.23	29.39	300.70	32.05	1.47
Astrand/Rhyming estimated VO_2 max	32.16	13.85	29.63	8.38	.80

[a]51 degrees of freedom

($.90^{t}51 = 1.68$)

TABLE 3

Table 3

Summary of Univariate F-ratios for Each Dependent Measure

Variable	F[a]	Probability F
STAI state anxiety	11.83	.0012**
STAI trait anxiety	12.26	.0010**
SDS depression	8.95	.0044**
TSCS self-concept	4.04	.0502
Astrand-Rhyming estimated VO_2 max	.80	.3745

[a] 1 and 48 degrees of freedom

** $p < .01$

TABLE 4

Table 4

Summary of Means and Standard Deviations for Dependent Measures, by Treatment Group

	Control Group (N = 26)		Exercise Group (N = 27)	
Variable	Mean	SD	Mean	SD
STAI state				
Pre	52.69	14.21	47.40	12.09
Post	38.42	13.28	27.88	7.55
STAI trait				
Pre	51.69	11.23	48.03	9.33
Post	42.92	11.69	32.18	8.59
SDS raw score				
Pre	44.03	11.75	42.18	8.12
Post	37.76	10.17	30.00	6.50
TSCS score				
Pre	288.23	29.39	300.70	32.05
Post	310.53	32.91	331.85	39.64
Astrand-Ryhming Estimated VO_2 max				
Pre	32.17	13.86	29.63	13.86
Post	29.61	12.20	34.08	9.47

APPENDIX A

Consent Form

Informed Consent for Fellowship Hall's Physical Rehabilitation Program

1. Explanation of Fellowship Hall's Rehabilitation Program

You will be placed on a rehabilitation program that will include physical exercises. The levels of exercise which you will undertake will be based on your cardiovascular response to an initial graded exercise test. You will be given explicit instructions regarding the amount and kind of regular exercise you should do. Organized exercise sessions will be available on a regularly scheduled basis. Your exercise sessions may be adjusted by the exercise specialist in consultation with the exercise program director and physician depending on your progress. You will be given the opportunity for re-evaluation with a graded exercise test 28 days after the initiation of the rehabilitation program. Other retests may be recommended as needed.

2. Monitoring

Your pre-exercise blood pressure will be monitored as required. You will monitor your own pulse rate before, during, and after each exercise session.

3. Risks and Discomforts

There exists the possibility of certain changes occurring during the exercise sessions. These include abnormal blood pressure, fainting, disorders of heart beat, and rare instances heart attack. Every effort

will be made to minimize them by the preliminary examination and by observations during exercise. Emergency equipment and trained personnel are available to deal with unusual situations which may arise.

4. Benefits to be Expected

Participation in the rehabilitation program may not benefit you directly in any way. The results obtained may help in evaluating in what types of activities you might engage safely in your daily life. No assurance can be given that the rehabilitation program will increase your functional capacity although widespread experience indicates that improvement is usually achieved.

5. Responsibility of the Participant

To gain expected benefits you must give priority to regular attendance and adherence to prescribed amounts of intensity, duration, frequency, progression, and type of activity.

To achieve the best possible preventive health care:

DO NOT:

A. Withhold any information pertinent to symptoms from the exercise specialist, nurse, physician, exercise program director, or other professional personnel.

B. Exceed target heart rate.

C. Exercise when you do not feel well.

D. Exercise within 2 hours after eating.

E. Exercise except with the exercise group.

F. Use extremely hot shower after exercising (stay out of sauna, steam bath, and similar extreme temperatures).

G. Undertake isometric or straining exercises.

DO: A. Report any unusual symptom which you experience before, during, or after exercise, or you notice in an exercising colleague.

6. Use of Medical Records

The information which is obtained during exercise testing and while I am a participant in the physical rehabilitation program will be treated as privileged and confidential. It is not to be released or revealed to any person except my referring physician without my written consent. The information obtained however, may be used for statistical analysis or scientific purpose with my right to privacy retained.

7. Inquiries

Any questions about the rehabilitation program are welcome. If you have doubts or questions, please ask us for further explanation.

8. Freedom of Consent

Your permission to engage in this Rehabilitation Program is voluntary. You are free to deny consent if

you so desire, both now and at any point in the program.

I acknowledge that I have read this form in its entirety or it has been read to me and that I understand the Rehabilitation Program in which I will be engaged. I accept the rules and regulations set forth. I consent to participate in this Rehabilitation Program.

Questions: _____

_____

_____

Response: _____

_____

_____
Signature of Patient

_____ _____
Date Witness

APPENDIX B

Exercise Sheet

EXERCISE DATA SHEET

NAME_____

HEART RATE RANGE(ten second count)_____

EXERCISE SESSIONS WEEK ONE

	Minutes	HR Beginning	HR Ending
Tuesday	_____	_____	_____
Thursday	_____	_____	_____
Saturday	_____	_____	_____

EXERCISE SESSIONS WEEK TWO

Tuesday	_____	_____	_____
Thursday	_____	_____	_____
Saturday	_____	_____	_____

EXERCISE SESSIONS WEEK THREE

Tuesday	_____	_____	_____
Thursday	_____	_____	_____
Saturday	_____	_____	_____

EXERCISE SESSIONS WEEK FOUR

Tuesday	_____	_____	_____
Thursday	_____	_____	_____
Saturday	_____	_____	_____

APPENDIX C

TWELVE ITEMS DELETED FROM TSCS

Twelve Items Deleted from TSCS

1. I am a decent sort of person.
2. I am a religious person.
3. I am a moral failure.
4. I am a bad person.
5. I am a morally weak person.
6. I am satisfied with my moral behavior.
7. I am as religious as I want to be.
8. I am satisfied with my relationship to God.
9. I ought to go to church more.
10. I am true to my religion in my everyday life.
11. I am a nobody.
12. I am losing my mind.

APPENDIX D

DATA RECORDING FORM

NAME

SOCIAL
SECURITY

PRE-TEST

Date Time Wt.

Minute	Work Load	Pulse Rate
0-1		
1-2		
2-3		
3-4		
4-5		
5-6		
Average 5-6		
If needed 6-7		

POST-TEST

Date Time Wt.

Minute	Work Load	Pulse Rate

APPENDIX E

PERSONAL DATA SHEET

Data Sheet

All data will be analyzed in strict confidentiality. No information will be released without your specific approval.

Personal History

Name: _____

Social Security Number: _____

Sex: _____

Age: _____

Marital Status: _____

Number of Children: _____

Ages of Children: _____

Occupation: _____

Estimated Annual Income: _____

Highest grade you completed: _____

Religious Preference: _____

Drinking History

Years drinking has been a problem for you: _____

Number of prior hospitalizations for alcoholism: _____

Number of alcohol related arrest (include DWIs): _____

Do you have relatives who have drinking problems: _____

If so, what relation are they to you? _____

APPENDIX F

Frequency Distribution of Occupations

Frequency Distribution of Occupations by Groups

	Control	Exercise
Realtor	2	1
Landscape	1	0
Lawyer	1	0
Secretary	1	0
Factory Work	4	3
Restaurant	2	0
Manager Railroad	1	0
Sign Erector	1	0
Teacher	1	1
Postal Employee	1	0
Executive	1	1
Engineer	1	0
Advertising	1	0
Student	1	1
City Manager	1	0
Waiter	1	0
Mechanic	0	0
Sales Clerk	0	1
Nurse	0	1
Retired	0	0

	Control	Exercise
Plumber	0	1
Flight Attendant	0	1
Housewife	0	1
	Total 21 (Total N = 26)	Total 17 (Total N = 27)