To the Graduate Council:

I am submitting herewith a dissertation written by Betsy Claire Rubin entitled "Comprehensive Weight Loss Employing Social Support and Aerobic Exercise." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Robert G. Wahler

Robert G. Wahler, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice Provost
and Dean of The Graduate School

# COMPREHENSIVE WEIGHT LOSS EMPLOYING SOCIAL SUPPORT AND AEROBIC EXERCISE

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Betsy Claire Rubin

August 1988

## DEDICATIONS

In the course of the past four years, I have had the extraodinary pleasure to have relationships with some wonderful people. Among these people are a very special few who I will remember always. I would like to dedicate my dissertation to these people, though it would be impossible to return to them all the good things they have given to me. I would like to thank Mary Pope, who taught me how to love and respect the hungers of my heart. I would also like to thank Mike O'Connell for his undying support and confidence but especially his laughter. To my closest friends, Connie Sanders-Cole and Joyce Marie Cartor, I thank you just for being. Your love and support are with me always and I cherish you. And last but certainly not least I would like to thank Gregg Jacobs. We have had the pleasure of sharing our lives for the past three years and the future belongs to our friendship.

## ACKNOWLEDGEMENTS

In the course of dissertation research, a number of scholars have assisted me generously. In particular I am indebted to Drs. Bob Wahler, B. Don Franks, John Lounsbury and Lenny Handler, who served as my director and committee respectively. I would especially like to thank Dr. Franks for his patience and assistance in helping me understand the vicissitudes of statistics. With their consultation, criticism, and encouragement, I was able to achieve results otherwise impossible. Whatever errors remain in my work, hoever, are soley my responsibility. I would especially like to thank the people at Ridgeview for letting me conduct my project at their institute.

## ABSTRACT

Weight loss is one of the most serious and refractory problems faced by the healthcare community. Traditional weight loss programs have usually been restricted to changing overt behaviors related to dieting. The current weight loss program was designed to take the dieter's physical and psychological wellbeing into account by combining a twelve week aerobic exercise program with social support groups geared toward understanding the emotional factors that underly obesity and overeating. Twenty-four subjects were recruited form the East Tennessee area based on their response to an advertisement entitled "Weight Loss and Wellness". The design is a pre- and posttreatment design with matched controls prior to random assignment. Each subject was assigned to one of three conditions: A full treatment group receiving exercise plus social support, an exercise only condition and a waiting list control group. An analysis of covariance revealed significant differences between the full treatment group and the other groups in terms of pounds lost. The full treatment group also lost significntly more body fat and demonstrated greater reductions in hip and waist girth measurements than those in control condition. The exercise only group was not significantly different from either the full treatment group or the control group on these variables. In terms of the physical fitness variables, there were significant differences in flexibility between all three groups with the exercise only group making the most gains in flexibility, followed by the FT group would made significantly greater gains than the control group. The full treatment group demonstrated significantly greater increases in abdominal strength than the control group, but the exercise only group was not significantly different from either the control group or the full treatment group. There were no significant findings with regard to improvements in cardiorespiratory functioning or self-esteem measures.

## TABLE OF CONTENTS


| CHAPTER | PAGE |
|---|---|
| I. INTRODUCTION | 1 |
| A. BEHAVIORAL APPROACHES TO OBESITY | 1 |
| B. EXERCISE AND WEIGHT LOSS | 3 |
| C. EXERCISE, WEIGHT LOSS AND CORONARY HEART DISEASE | 8 |
| D. EXERCISE, WEIGHT LOSS AND SELF-ESTEEM | 11 |
| II. IMPLICATIONS OF LITERATURE REVEIW | 21 |
| A. HYPOTHESIS | 21 |
| III. METHOD | 23 |
| A. RESEARCH DESIGN | 23 |
| B. MEASURES OF SELF-ESTEEM | 24 |
| C. MEASURES OF PHYSICAL FITNESS | 25 |
| IV. RESULTS | 27 |
| A. TABLE ONE: MEANS AND STANDARD DEVIATIONS | 28 |
| B. TABLE TWO: ANALYSIS OF COVARIANCE SUMMARY | 32 |
| V. DISCUSSION | 36 |
| A. OVERWEIGHT AND UNDERFED: THE CLINICAL AND THEORETICAL IMPLICATIONS OF OVEREATING | 39 |
| REFERENCES | 48 |
| VITA | 59 |

# CHAPTER I

## INTRODUCTION

Obesity is one of the most prevalent and refractory disorders faced by the medical and psychological community. It is associated with the increased risk of cardio-vascular disease (Borhani, 1977; Fox, Naughton & Haskell, 1971; Haskell & Superko, 1984; Kannel & Sorlie, 1979; Paffenberger , Hale , Brand & Hyde, 1977) as well as other diseases such as diabetes and low self-esteem (Lerner, 1973; Short, DiCarlo, Stefee & Pavlov, 1983; Wooley, Wooley, & Dyrenforth, 1979). Estimates of the prevalence of obesity range from 15% to 50% of the American population (Bray, 1976; Van Itallie, 1977). Dietary treatments of obesity have been notoriously unsuccessful in attaining large weight losses and maintaining those losses (Brownell, 1982). Stunkard (1958; 1980) reports that fewer than 5% of dieters lose 40 pounds or more and even fewer maintain that loss. Brownell (1982) contends that "if a cure from obesity is defined as a reduction to ideal weight for five years, a person is more likely to recover from most forms of cancer than from obesity" (p.821). Obesity is a complex psychological and physiological problem that requires a multifaceted treatment approach. The purpose of this study is to address the treatment of obesity from a multidisciplinary position including social support, behavioral techniques, aerobic exercise and lifestyle change. The effects of a weight control program that combines social support with aerobic exercise will be examined with a special focus on self-esteem and physical fitness.

## BEHAVIORAL APPROACHES TO OBESITY

Behavioral programs for the treatment of obesity have been significantly more effective than techniques that simply provide information (Gierszewski, 1983). At least one hundred controlled studies have been done on the behavioral treatment of obesity and the results have been consistent (Brownell, 1982). Short term weight losses average around eleven pounds in programs of ten to twelve weeks (Brownell, 1982; Wilson & Brownell, 1980). Furthermore, the one pound per week consistencies in weight lost have been reported despite differences in treatment fees, training of therapists and demographic characteristics of the patients (Brownell,

Heckerman & Westlake, 1979; Foreyt, Goodrick & Gotto, 1981; Jeffrey, Wing & Stunkard, 1978).

Behavior modification approaches to weight reduction are usually based on the assumption that eating behavior is learned. From this perspective it follows that one can achieve self-control by manipulating antecedent cues as well as the consequent events of overeating (Miller & Sims, 1981). Methods of stimulus control include breaking associations between eating and other activities such as television viewing, keeping a daily journal of foods eaten, restructuring the home environment to keep foods out of the usual range and less accessible, and eating more slowly with smaller mouthfuls. Consequences would include rewarding oneself for eating habit changes and weight loss.

In one of the better designed behavioral studies, Miller and Sims (1981) performed a component analysis of a comprehensive weight loss program including diet, nutrition, education, health education, behavior modification and exercise. They did not find that stimulus control and contingency management techniques were significantly related to long term success. They did find that stimulus control and contingency management techniques were significantly useful to the initial phase of weight loss but not for the continued weight loss or weight loss maintenance. Significant differences were found for the use of cognitive restructuring, exercise and eating style change. These results are consistent with Mahoney and Mahoney's (1976) finding that changes in perfectionistic standards, negative beliefs and self-defeating private monologs are important in determining long-term weight loss success rates.

In their 1979 review of the behavioral literature, Wing and Jeffery report that differences in the reinforcement variables which affect treatment compliance increase results significantly. They report that weight loss programs that provide external support such as frequent contact with a therapist or instructor, social pressure, or monetary incentive in the form of contingency contracts produce the best results. In fact, Jeffery and Wing (1979) found that subjects contacted three times per week by a therapist lost nearly twice as much weight over five weeks of treatment than did subjects who were only seen once a week.

In accordance with Wing and Jeffery's (1979) findings, other researchers have found social support to be an important factor in weight loss and weight loss maintenance (Brownell, Heckerman, Westlake, Hayes & Monti, 1978; Brownell, 1984; Mahoney & Mahoney, 1976). In a well controlled study, Brownell et al.

(1978) found that when spouses were taught specific supportive interventions weight losses tripled those of patients whose spouses were not trained. In their two year follow-up study, Mahoney and Mahoney (1976) found a positive correlation of .63 between weight loss and family support. Miller and Sims (1981) found that patients who were taught interpersonal skills (such as assertiveness) that would be helpful in attaining needed support from others significantly achieved weight loss and weight loss maintenance. Abrams and Follick (1983) found that professionally led behavioral weight loss groups at the worksite produced significant results. In addition, they found that professionally led weight loss groups lost and maintained that loss significantly more than self-help groups.

In some cases behavior modification may not be enough. For patients with high-risk obesity in which excess weight is medically significant, very low calorie diets (VLCD) may be an appropriate and effective initial treatment plan. "Medically significant" obesity has been defined by several authors (Kannel & Gordon, 1979; Palgi, Read, Greenberg, Heofer, Bistrian & Blackburn, 1985; Van Itallie, 1980) as ranging from 120% to 160% of ideal body weight. The medical risks associated with obesity appear to increase continuously with increasing weight.

There seems to be considerable debate over whether these VLCD for high risk obesity patients should consist of proteins, carbohydrates, or both. Palgi et al. (1985) maintain that protein diets produce ketosis effects that are absent in carbohydrate diets and significantly enhance the anorectic effects of dieting, Palgi et al. (1981) employed a multidisciplinary treatment approach consisting of diet, exercise, behavior modification and nutritional education. They claim better results than programs using VLCD of carbohydrates and a combination of carbohydrates and proteins. However, methodological problems in the studies employing other VLCD programs make such comparisons spurious (Yang, Barbosa-Sadivar, PiSunyer, & Van Itallie, 1981).

## EXERCISE AND WEIGHT LOSS

Perhaps the most important component of any weight loss program is exercise (Brownell, 1982: Brownell, 1984; Dahlkoetter, Callahan & Linton, 1979; Lebow, 1977; Mahoney & Mahoney, 1976; Miller & Sims, 1981; Thompson, Jarvie, Lahey & Cureton, 1982; Wooley, Wooley and Dyrenforth, 1979). Mahoney and Mahoney (1976) consider exercise to be " an essential element in weight loss and weight

maintenance" (p .64). Unfortunately they also report that few weight control programs employ exercise as an important part of treatment. Many studies have focused their treatment methods on changing eating behaviors but have neglected the role of energy expenditure (Dahlkoetter et al., 1979). Lebow (1977) reviewed one hundred and five weight control studies and found that 805 of these studies had neglected energy output. They concluded that the role of energy output is equal to that of energy intake (caloric consumption) in the energy balance equation. Weight loss occurs when energy output exceeds intake.

Several common misconceptions related to weight and exercise are being debated in recent research (Brownell, 1982; Garrow, 1978; Thompson et al., 1982; Wooley et al., 1979). One common misconception is that obese individuals habitually consume more calories than their non-obese counterparts. In a recent review of studies comparing the intake rates of obese and matched normal controls, Thompson et al. (1982) support the findings of Garrow (1978) and Wooley et al. (1979) that obese individuals do not necessarily eat more than their leaner counterparts. Of the studies reviewed, six found no significant differences between obese and non-obese populations, five found obese populations consumed significantly less, and only two found obese populations consuming more that non-obese subjects. As early as 1958, Stunkard reported that obese subjects were less physically active, and in fact, consumed less calories than non-obese subjects matched for age, sex and occupation. The role of inactivity in the development of obesity in adults is not clear. Inactivity may be "a consequence rather than a cause of obesity and ... may maintain obesity even if it did not contribute to the development of obesity. This possibility increases the importance of exercise for treatment" (Brownell, 1982, pp. 830-831). Brownell (1984) contends that willingness to be physically active is a strong predictor of treatment success.

According to Brownell (1982) there are five major reasons why exercise is an important component of weight reduction programs, though all are not proven to the same degree. These include: (a) increase in energy expenditure, (b) increase in basal metabolic rate (BMR), (c) minimize the loss of lean body tissue, (d) counteract the ill effects of obesity, (e) suppress appetite. Thompson et al. (1982) maintain that it is not essential to the treatment of obesity to demonstrate the role of inactivity. Thus the following discussion will be limited to those aspects of exercise pertinent to the treatment of obesity and not its etiology.

Basal metabolic rate (BMR) accounts for the majority of energy expenditure

(Brownell, 1982). An individuals age, sex, weight, body composition (lean to fat ratio) and hormone levels affect BMR (Thompson et al., 1982). Assessment of BMR occurs in resting conditions in an environment with neutral thermal conditions approximately 12 - 18 hours after a meal (Garrow, 1978). This is the minimal level of energy needed to sustain vital body functions. An individual's total energy expenditure is a result of their BMR and changes in their resting rate (Thompson et al., 1982). BMR is elevated by such factors as increases in food intake, stress, cold weather, and exercise (Bray & Atkinson, 1977). Increase in BMR represent increases in energy expenditure. Guyton (1979) contends that exercise is the most powerful stimulus for increasing [basal] metabolic rate" (p. 425).

The amount of energy expenditure is a function of the duration and intensity of the exercise. The higher the intensity and/or the duration of the exercise the greater the effect on BMR, and hence, the amount of energy expenditure. The issue is not whether exercise affects energy expenditure or not, but whether the increase in caloric expenditure is substantial enough to be significant and effective. Brownell (1982) maintains that for dieters the long term cumulative effects of exercise are more important than the short term effects.

In their recent review of the literature, Thompson et al. (1982) elucidate the debate surrounding the exercise benefit issue. They contend that consistent increases in energy expenditure or 75 to 100 calories a day (the approximate equivalent to walking one mile for most people) without concommitant increases or decreases in caloric consumption are equivalent to a ten pound weight loss over one year (Mayer & Bullen, 1974). Garrow (1974, 1978) points out that the true net effect of the exercise is the cost of the exercise minus the normal activity that would have otherwise occupied the individual. Thus, if it takes an individual twenty minutes to walk a mile at the rate of 100 calories, the net effect is the 100 calories minus the 40 calories he/she would have normally expended.

Fortunately, the increases in BMR outlast the actual exercise period. This increase in energy expenditure has an effect on the total energy cost of the activity (Thompson et al., 1982). There is a wide range in reported expenditures based on a wide variety of exercise tasks. Thompson et al. (1982) report that as of the time of their literature review no studies were done to systematically test various activities at different degrees of intensity and duration to determine the differential effects of post-exercise metabolic rate. "The effects of "body composition (fat versus muscle), weight status (obese versus non-obese), and fitness level (trained versus untrained) on post

exercise metabolic expenditure have not been analyzed" (p. 65).

Recent research by Bray (1970), Garrow (1978), Thompson et al. (1982), and Wooley et al. (1979), had indicated that there are physiological mechanisms that counteract the effects of reduced intake. Decreases in food intake cause reductions in BMR, the major source of energy expenditure. This mechanism is thought to serve an adaptive function when the body is faced with starvation. The decrease in energy output can equal the effects of reduced energy intake (dieting). The result is a plateauing of weight loss despite restricted caloric intake (Bray, 1970; Buskirk, 1974; Craddock, 1978). The phenomenon of restricted output was reported as early as 1919, and has never failed to occur in any study that has looked for it's effect (Garrow, 1978).

In addition to lowering BMR, dieting reduces the energy costs of particular tasks (Apfelbaum, Bostsarron & Lacatis, 1971). This is measured by oxygen consumption and equals 12% - 29% when compared with non-dietary controls. Some researchers contend that these are the mechanisms underlying the well established plateauing of weight loss while under caloric deprivation (Buskirk, 1974; Craddock, 1978). The unfortunate consequence is a weight that is stabilized and maintained in spite of low caloric intake (Bender & Bender, 1976; Bray, 1970; Garrow, 1978; Thompson et al., 1982).

Decreases in BMR can equal 15% - 30% through caloric restriction (Apfelbaum et al., 1971; Bray, 1969; Drennick & Denin, 1973; Krotkiewski, Sjostrom & Sullivan, 1977). This undesirable physiological concomitant of dietary restriction can reach 20% in two weeks and can be measured within 48 hours of dietary restriction (Bray, 1969; Brownell, 1982). Furthermore, permanent effects of these reductions in metabolic rate caused by repeated dietary restrictions have been reported (Boyle, Storlien, & Keesey, 1978; Brownell, 1982; Garrow, 1974). There is some evidence to suggest that failed diets can result in even greater weight gains as result of decreased metabolic rate (Wooley et al., 1979).

There are some researchers who believe that exercise may counter the decrease in BMR caused by caloric restriction (Bray, 1969; Brownell, 1982; Brownell & Stunkard, 1980; Mayer, 1968; Nelson, 1978; Schener & Tipton, 1977; Van Itallie, 1978). However, though exercise increases metabolic rate, dieting decreases the energy cost of a specific task (Apfelbaum, 1978) so that BMR is not elevated during caloric deprivation to the degree it would be during normal intake periods. Thompson et al. (1981) suggest that "further studies should attempt to measure BMR

in individuals who have engaged in varying intensities of exercises during different phases (time intervals) and degrees of caloric restriction. This information might allow for the determination of how much exercise might restore BMR to normal levels during caloric restriction" (p. 67).

The "thermic effect" or "dietary induced thermogenesis" are terms used to describe increases in metabolic rate following and resulting from the ingestion of food. The energy expended in this process varies with the proportions of fats, carbohydrates and proteins found in the diet (Guyton, 1979), accounting for 7% - 10% of caloric intake (Bray, 1976; Miller, Mumford & Stock, 1967; Thompson et al., 1982). The thermic effect may be reduced by dieting. In their review of the literature, Thompson et al. (1982) report mixed findings on the question of whether exercising immediately after eating produces larger thermic responses to the meal. They contend that obese individuals "may have a lower resting and a lower exercise-induced thermic response to food ingestion... Thus, in addition to its deleterious effect on BMR, dieting may also reduce energy output by decreasing the thermic response to a meal" (p. 66).

Another advantage of exercise in weight management programs is increasing lean body mass and decreasing body fat (Parizkova, 1977). Historically, obesity has been defined by total body weight and changes in body weight have been the primary dependent variable in weight control research (Thompson et al., 1982). More recently, the measure of lean body mass (LBM) and body fat are considered more accurate in the assessment of obesity and for determining the efficacy of weight control programs (Katch & McArdle, 1977; Rogers, Mahoney, Mahoney, Straw, & Kenigsberg, 1980; Thompson et al., 1982; Wilson, 1978).

Exercise decreases body fat without the the deleterious effect on LBM associated with weight loss through dietary restriction alone. There are two kinds of fat: essential fat (fat that is stored in the bone marrow, heart, lungs, intestines, etc.) and storage fat (subcutaneous adiposity plus fatty tissues that protect vital organs) (Katch & McArdle, 1977). Reducing storage fat is the goal of weight reduction programs. LBM is the fat free component of the body. Increases or decreases in LBM are the result of changes in the proportion of muscle mass in the body. Exercise changes LBM by increasing muscle mass. Muscle is more dense and heavier than body fat and therefore reductions in body fat may not result in changes in body weight (Parizkova, 1973, 1977; Thompson et al., 1982; Wallace, 1975; Wilmore, 1973). In addition, exercise decreases body fat without caloric restriction (Bjorntorp, 1980; Gwinup, 1975; Leon, Conrad, Hunninglake & Serfass, 1979) and reductions in

activity result in increases of body fat in spite of caloric restriction (Parizkova, 1977). Exercise decreases storage fat rather than LBM, while dietary intervention alone reduces both (Thompson et al., 1982). Research findings demonstrate that exercise increases LBM, reduces body fat and thus effects BMR which, in turn increases total energy expenditure (Parizkova, 1977).

The way an individual becomes fat influences the amount of fat reduction possible through exercise. Adiposity in obese individuals occurs in two ways: hypertrophy (enlargement of existing fat cells) and hyperplasia (increases in the number of fat cells), either or both of which can be present in an individual (Thompson et al., 1982). In adults, exercise can reduce fat cell size but not fat cell number. Bjorntorp (1978) found that individuals with moderate hypertrophic obesity are most likely to benefit from exercise training.

Aerobic exercise plays an important role in initial weight loss and in maintaining that loss (Brownell, 1982). In addition to producing and maintaining weight loss, aerobic exercise improves the lean to fat ratio of body composition in normal and obese individuals (Brownell, 1982). However, without concurrent dietary restrictions changes in body weight and body fat are clinically small (Epstein & Wing, 1980). Controlled studies support the hypothesis that treatment programs which emphasize increased caloric expenditure as well as reduced caloric intake produce greater average weight losses and better maintenance (Dahlkoetter et al., 1979; Martin & Dubbert, 1982; Stalonas, Johnson & Christ, 1978).

## EXERCISE, WEIGHT LOSS AND CORONARY HEART DISEASE

Exercise, weight reduction and lifestyle change have important implications for the prevention of cardiovascular diseases and diabetes thus reducing healthcare costs. One of the strongest arguments for primary prevention is the reduction in healthcare costs through improved health status and the decrease in the incidence of disease. Kannel and Gordon (1979) contend that weight management is one of the most important health prevention measures of cardiovascular disease aside from smoking cessation.

The World Health Organization has described cardiovascular disease as having the potential to be the greatest epidemic the world has faced (Borhani, 1977). Coronary heart disease (CHD) accounts for nearly half of all deaths. Yet, at the present time less than 2% of all the total amount spent on healthcare is being spent on prevention.

Changing lifestyles and attitudes about exercising, smoking and eating are at the core of preventative and therapeutic measures.

Epidemiological researchers, exercise physiologists and psychologists have suggested that there is an inverse relationship between physical activity and cardiovascular morbidity and mortality (Fox, Naughton & Haskell, 1971; Kannel & Sorlie, 1979; Paffenberger, Hale, Brand & Hyde, 1977). Haskell and Superko (1984) contend that individuals who are physically active demonstrate fewer clinical manifestations of CHD. Moreover, when CHD does occur it tends to be less severe and the onset appears at a later age in individuals who engage in regular physical activity. Froelicher and Oberman (1972) maintain that the majority of population studies show significantly lower disease rates for active individuals, with some studies reporting only modest differences and others reporting no difference. However, none of the reviewed studies reported higher rates of CHD for active persons. While no cause-and-effect relationships have been established, there does appear to be a strong association between level of exercise and reduced risk of cardiovascular disease.

In addition to reducing the risks associated with obesity, many mechanisms have been cited to account for the ways in which physical activity may prevent CHD. Haskell and Superko (1984) propose that most of the mechanisms of action work to reduce the likelihood that the oxygen demands of the myocardium will exceed the oxygen delivery capacity of the myocardial ischemia. The proposed mechanisms fall into the category of either maintaining or increasing the oxygen supply in the myocardium. Coronary atherosclerosis usually results from reduced oxygen supply in the myocardium. Physical fitness training is the most direct means of maintaining or increasing the oxygen supply in the myocardium. Haskell and Superko (1984) suggest that increases in oxygen availability to the myocardium may be achieved by either the delayed progression of atherosclerosis, by an increase in lumen diameter of the major coronary arteries or by coronary collateral vascularization. Research in this area has been greatly limited by the necessity of using invasive medical techniques.

Atherosclerosis is a complex physiological process that is associated with certain behaviors as well as genetic predispositions. The clinical manifestations of atherosclerosis include angina pectoris, myocardial infarction, aortic aneurism and occlusive peripheral disease. There are several suspected and well established risk factors that are associated with CHD. Altekrause and Wilmore (1973) propose that these include: obesity, physical inactivity, hypertension, high serum cholesterol

levels, elevated levels of triglycerides and lipoproteins and cigarette smoking. These risk factors are inextricably interrelated to predispose an individual to CHD and make it extremely difficult to isolate physical inactivity as the single causal agent (Pauly, Palmer, Wright & Pfeiffer, 1982).

Pauly et al. (1982) report that the role of plasma lipoproteins in the development of atherosclerosis and CHD has gained a considerable amount of attention in recent years. They suggest there exists an inverse relationship between high plasma lipoproteins (HDL's) and the incidence of CHD. Furthermore, it seems that the total cholesterol/high density lipoprotein (CHOL/HDL) ratio is more important than total cholesterol alone in the development of cardiovascular disease (Castelli, Doyle & Gordon, 1977; Miller & Miller, 1975). Pauly et al. (1982) propose that individuals with high levels of cholesterol may enjoy some protection if they also have high levels of HDL.

Exercise may play an important role in altering blood lipid profiles (Pauly et al., 1982; Hicks, Morton & Brammell, 1979). Hicks et al. (1979) conducted a feasibility study with 237 executives in the National Aeronautics and Space Administration. They found significant improvements in several cardiovascular functions as well as in weight, body fat percentages and triglyceride levels. Hicks et al. also report lowered total triglyceride levels and total cholesterol levels increased HDL and improved the CHOL/HDL ratio. Hartung and Squires (1980) found higher levels of HDL's in middle-aged men who participated in regular exercise programs including running, jogging, cross-country skiing and bicycling, compared with nonexercising controls. Pauly et al. (1982) found reductions in body fat percentage, resting heart rate and systolic blood pressure, increases in maximal oxygen uptake and decreases in triglyceride levels and total cholesterol levels following a 14 week aerobic exercise program. They found for maximal decreases in trigylceride levels one should exercise 3.3 times weekly for at least 20 minutes.

For the prevention of CHD the amount (intensity and duration) of exercise necessary to influence risk factors varies across studies. Paffenberger, Wing and Hyde (1978) report that the greatest difference in risk is evidenced between the least active and those who engage in moderate exercise on a regular basis. Differences between moderate and high level exercisers are comparably smaller. These differences hold both for job related and non-job related activities. Paffenberger et al. (1978) interpret these findings to indicate that threshold of activity of either higher intensity or duration is needed to obtain cardiovascular benefit. Haskell (1984)

recommends energy expenditures per day of 100 to 500 Kcal/d for leisure or non-job related activities and 300 to 800 Kcal/d for job related activity. Healthy adults can achieve the 300 Kcal/d difference in non-job related or leisure activity in about 30 to 60 minutes of moderate intensity exercise using large muscle, dynamic exercise such as aerobic dance, swimming or running. As mentioned earlier, physical activity also contributes to the prevention of CHD by preventing and treating obesity.

In addition to the prevention of cardiovascular disease, exercise may play an important role in the prevention of hypertension. Although exercise is not the treatment of choice for hypertension or for the control of high blood pressure, it appears to be a good preventative measure. Cooper, Pollock, and Martin (1976) propose that while it is possible for a person to be physically fit and still be hypertensive, it seems that in the general population people who are more active tend to have lower systolic and diastolic blood pressures. Roman, Camuzzi and Villalon (1981) found that endurance exercise training by borderline and essentially hypertensive individuals resulted in lower blood pressure, with declines in systolic blood pressure usually exceeding declines in diastolic blood pressure. However, studies such as these are wrought with methodological difficulties since nonexercising controls were sometimes not employed. Furthermore, the underlying mechanisms for reduced blood pressure that result from exercise training have not been clearly established.

Up to this point I have discussed the physiological benefits of chronic aerobic exercise with regard to weight loss and cardiovascular performance. It appears that there may exist some psychological benefits to aerobic exercise as well. In the following section I will discuss the relationship between self-esteem, physical fitness and weight reduction.

## EXERCISE, WEIGHT LOSS AND SELF-ESTEEM

Self-concept can be defined as an "organized configuration of perceptions of the self which are admissible to awareness. It is composed of such elements as the perceptions of one's characteristics and abilities; the percepts and concepts of the self in relation to others and to the environment; the value qualities which are perceived as being associated with experience and objects; and goals and ideas which are perceived as having positive and negative valence" (Rogers, 1951, p. 136). Lynch, Gergen and Norem-Hebeisem (1978) maintain that this perception of the self is

determined in part by the organism's physical being as well as it's social and physical environment and the passage of time. It is both the product and the producer of perception. Self-esteem is usually considered to be the evaluative component of self-concept (Gergen, 1971; Lynch, Gergen & Norem-Hebeseim, 1978; Sonstroem, 1984; Wylie, 1974). Gergin (1977) considers self-esteem to be the degree to which one evaluates oneself positively. As Sonstroem (1984) points out, self-concept is usually associated with description and self-esteem is usually associated with evaluation. Sonstroem postulates that the two terms are often used interchangeably because "evaluation seems to be a natural consequence of self description and seems more immediately applicable to mental health" (p. 125). The two terms will be used interchangeably for the rest of the discussion.

Wooley et al. (1979) contend that although poor self-esteem is a problem for many people, it deserves some special consideration in the case of obesity. They maintain that "obese people, like the physically handicapped, wear their 'problem' for all to see at all times, and yet unlike those groups are held responsible for their condition. They can scarcely avoid interactions with others in which weight and eating behavior aren't an explicit topic of discussion, concern and criticism or a covert determination of other's evaluations" (p.18).

The prejudice against obese individuals begins at a very early age. Studies of the attitudes of children toward overweight peers reveal that these attitudes are negative from as early as age five (Lerner, 1969; Lerner & Gelbert, 1969; Lerner & Korn, 1972; Staffieri, 1967; Staffieri, 1972). These studies have shown that overweight children are frequently judged to be dishonest, ugly, stupid, mean, sloppy and lazy. Furthermore, Lerner (1973) found that children desire to maintain greater interpersonal distance from overweight children than from their leaner counterparts. Unfortunately, these prejudices are found in adults and even in groups of health professionals (Wooley et al., 1979).

These negative attitudes toward obesity are intensified during adolescence, especially among females (Wooley et al., 1979). Few adolescent girls feel they are thin enough and very high proportions attempt to diet (Clifford, 1971; Crisp, 1977; Douty, Moore & Hartford, 1974; Jourard & Secord, 1955). Crisp, Palmer and Lacey (1976) maintain that there has been a recent rise in the incidence of anorexia nervosa and bulimia in the past 15 years and these disorders are almost exclusively associated with girls and women. Advocates of psychoanalytic self psychology suggest that these disorders are associated with deficits in the organization of the self

and self structure as well as the ability to modulate self-esteem (Bruch, 1962; 1977; 1985; Goodsitt, 1977; 1985; Jones, 1985; Orbach, 1985).

Obese individuals often display deep seated feelings of self-contempt and self-hatred (Bruch, 1962; 1977; 1985; Goodsitt, 1985; Jones, 1985; Wooley et al., 1979). To ignore this aspect of the overweight individuals' dynamics in planning a treatment modality would be a disservice. In essence, it would be tantamount to ignoring these individuals' real needs and may represent a recapitulation of the problem that contributed to their weight problem in the first place.

Hilda Bruch (1962; 1977; 1985) maintains that being overweight is a symptom of being out of touch with one's emotional and interpersonal needs. She postulates that as children, overweight people were not taught to distinguish between hunger and other emotional needs. Thus, the need to be comforted, soothed, entertained, held or even the need to express anger or sadness is mistaken as the need for food. Roth (1982) maintains that compulsive overeating is an attempt to combat emotional and interpersonal deprivation. She contends that dieting alone doesn't work because it just adds deprivation to people who are already feeling deprived. In her book "Feeding the Hungry Heart" she describes the process of nurturing the self and meeting ones emotional needs in order to treat the cause of obesity (emotional deprivation) rather the the symptoms (excess weight).

Thus, a viable approach to the treatment of obesity should include aspects that help individuals gain greater self acceptance, increase awareness as to the emotional aspects of overeating and teach the skills necessary to combat feelings of deprivation associated with dieting as well as techniques geared toward nurturing the self. One way to nurture the self and contribute to a sense of competency and mastery is exercise. Many psychologists, physical therapists, physical educators and other allied health professionals have recognized that as their clients increase in physical fitness they also exhibit improvements in psychological fitness such as self-esteem (Collingwood & Willett, 1971; Collingwood, 1972; deVries, 1968; Eichoff, Thorland & Ansorage, 1983; Folkins & Sime, 1981; Folkins, Lynch & Gardner, 1972; Hilyer, 1982; Hilyer & Mitchell, 1979; Morgan, 1970; Short et al., 1983; Sonstroem, 1984).

One of the earliest research studies on the effects of physical fitness training on self-concept was done by Collingwood and Willett (1971) which espoused Carkuff's (1971) Human Resource Model. This model is based on the belief that an individual's physical functioning is integrated with intellectual, emotional and

interpersonal spheres of functioning. The underlying assumption is that changes in one sphere can promulgate changes in other spheres of functioning. Using a pre-experimental research design, Collingwood and Willett (1971) found that after a three week training program five obese boys experienced significant increases in fitness performances, positive body attitude, positive self-attitude and self acceptance as well as decreases in real versus ideal self discrepancy. In an effort to improve on this study, Collingwood (1972) used a quasi-experimental design with 25 adult rehabilitation clients in a four week training program. He found that subjects evidenced significantly greater increases over a matched control group in physical fitness performance, body attitude, self acceptance and positive physical, intellectual, emotional and interpersonal behaviors. While some of the threats to internal validity such as selection bias have been controlled for, this study has limited generalizability.

Short et al. (1983) randomly assigned 45 metropolitan policeman who were considered to be 20% over their optimum body weights to either and aerobic conditioning group or one that did not receive aerobic training. Both groups received weekly instruction in cardiovascular fitness and evidenced increases on the Physical-Self, Personal-Self, and Self-Satisfaction subscales of the Tennessee Self-Concept Scale (TSCS). However, the aerobic conditioning group increased two to three times more than the controls. Interestingly, although the groups significantly increased their Physical-Self scores (supposed to measure an individual's "view of his body, the state of his health, physical appearance, skills and sexuality" ) they still did not increase to the test norm indicating that the problem of self-esteem and obestiy is a difficult and refractory problem. Another interesting finding made by Short et al. was a decrease in the total variability scale of the TSCS, a scale designed to assess an individual's self-integration, with low scores reflecting a well integrated self . These findings may be consistent with Collingwood's view that as an individual increases in physical fitness abilities, their physical functioning becomes integrated with psychological functioning. Of course, these changes may be the result of an interactive effect between diet, weight loss, exercise and involvement in the program. The generalizability of these results are limited by the lack of a non-conditioned, non-instructed control group.

Jasnoski, Holmes, Solomon and Aguiar (1981), employing a quasi-experimental design with 20 female college students in a ten week training program, found significant increases in subjects' fitness levels and subjects' perceptions of their abilities, both in physical activities and non physical activities such as study capability

and frustration tolerance. These results were not obtained with the waiting list control group. Jasnoski et al. postulate that the changes in self perceptions were related to participation in the physical fitness training program rather than changes in physical fitness. They conclude that for their study, changes in self perceptions were due to social or personal factors since changes in aerobic capacity were not related to the subjects' self reports of improved abilities. The role of cognitions and self perceptions will be explored later when discussing Heap's (1978) viewpoint.

In one of the better designed studies, Hilyer and Mitchell (1979) ran a ten week fitness program in which 40 subjects were randomly assigned to either a running group, a running plus counseling group or a control group. Subjects were also separated for statistical purposes on the basis of high and low initial levels of self-esteem as measured by the TSCS. Hilyer and Mitchell found that when subjects with initially low levels of self-esteem were put in the counseling-plus-systematic physical fitness training group they made considerably higher increases on all scales of the the TSCS than either the running group alone or the control group. Furthermore, they found the most dramatic changes on measures of personal self identity and self-satisfaction. Interestingly, they found only modest gains in the Physical Self subscale of the TSCS.

Hilyer and Mitchell interpret these findings to mean that students with initially high levels of self-esteem do not have much of a change to make, whereas students with low self-concepts can benefit from what high self-concept people already know: that he or she is an adequate and capable human being. They conclude that counseling shortens the time necessary for the changes seen in physical fitness programs. Hilyer and Mitchell attribute their findings to their subjects' increased sense of mastery and control over one's self and one's environment that is engendered in physical fitness training. Hilyer and Mitchell's results would have been more potent had they employed pre- and post- fitness measures and physiological tests of cardiorespiratory endurance. In a later study, Hilyer (1982) found similar results when employing a true experimental design with youthful offenders.

Eichoff, Thorland and Ansorage (1983) found significant changes in the Physical Self subscale of the TSCS within the initially low fit experimental group following a ten week aerobic dance exercise training program. However, the submaximal exercise heartrates of the aerobic dancers were not significantly reduced below the level of the control group. This may indicate that the higher levels of sustained overload were not present in the aerobic dance routines. It may be that high fit

subjects would have also shown improvements in self-concept if training included higher levels of sustained overload. Any statement that assumes a dose-response relationship between exercise and psychological variables should obviously be made with caution. Furthermore, other researchers such as Morgan (1976; 1981) and Folkins, Lynch and Gardner (1972; 1981) have alternative explanations for the low fit - high fit differences.

Folkins, Lynch and Gardner (1972) found significant changes following a 16 week running program in their female subjects but <u>not</u> their male subjects, using measures of self confidence, anxiety, depression and adjustment. They interpret these results as follows: The women were in poorer condition to begin with and scored lower on self confidence and adjustment variables than did the men or their control group counterparts. Thus, Folkins et al. conclude that those subjects who are in the poorest condition, both physically and psychologically will make the most improvements. These findings tend to be supported by other researchers ( deVries, 1968; McPherson, Paivio, Yuhasz, Rechnitzer, Pickard, & Lefcoe, 1967; Hilyer & Mitchell, 1979; Eichoff et al., 1983) but could possibly be due to statistical regression.

While a causal relationship between stress changes and psychological variables has not been demonstrated by Folkins et al., the correlational data are indeed impressive. They found that the greater the improvement in physical fitness, as measured by the time of a 1.75 mile run, the more likely it is that the subject would become more self confident and more personally adjusted, as well as becoming less depressed and anxious. These correlations were consistently positive. Furthermore, these changes were not found in the control group participating in archery or golf lessons, suggesting it may not be a socialization effect or the Hawthorne effect that accounts for all changes in psychological fitness. While Folkins et al. do not propose that they have demonstrated a causal relationship, they do propose that perhaps the restorative effect of increased physical fitness on psychological fitness may be the result of feelings of physical well being (such as feedback from heart and limbs). They contend that these physical indices of fitness when interpreted at a cognitive level enhance a person's feeling of psychological wellbeing.

Despite methodological inadequacies, there appear to be rather consistent findings that associate increased fitness with higher levels on self-esteem measures. Hanson and Nedde (1974) found that previously sedentary females participating in a long term physical training program made significant increases in the Self Satisfaction,

Self Acceptance , Physical Self, Personal Selfworth and Social Self Adequacy subscales of the TSCS. McGowan, Jarman and Pederson (1984), employing a true active experimental design, found significant increases in subjects self-concept scores but not in their peer approval after completing a competitive endurance training program. Albinson (1974) reports that physically active males tended to have better self-concepts than inactive ones. Hughes (1984) and White (1973) independently found that self-concept can be raised by increasing subjects' level of fitness. Perri and Templer (1985) have extended their research on fitness and self-concept to older adults (ages 60-79). They found significant improvements in self-concept and greater perceived locus of control. They interpret these results to indicate that subjects experienced an increase in self confidence and a sense of mastery over their environment. Martinek, Cheffers and Zaichowsky (1978) found that along with improvements in motor skill, an organized physical activity program had a positive effect on children's self concept. Pauly et al. (1982) found significant improvements on the Physical, Personal and Social Self subscales of the TSCS following a 14 week employee fitness program. While these findings are often limited by methodological inadequacies, it appears that a consistent pattern of exercise is associated with increases on self-esteem measures.

In an effort to generate data that could help establish causality, Goldwater and Collis (1985) employed an experimental design that randomly assigned subjects to a cardiovascular conditioning program or to a control program that, while giving the appearance of providing cardiovascular conditioning, gave only minimal benefits. However, they did not employ adequate measures of self-esteem. The tests they employed were neither global nor part scale measures of self-esteem. Rather, they used four, nine point scales designed to assess subjective wellbeing, including self-confidence. Goldwater and Collis' rationale for using this type of measure was based on the belief that simple ratings are "more effective than more elaborate instruments"(p.177). This scale consisted of a single item on which subjects rated themselves as being "the most confident I have ever felt " to "the most insecure and least confident I have felt". Of the subjective wellbeing measures this was the only item on which subjects did not demonstrate significant improvement. It is unfortunate that Goldwater and Collis did not employ better measures of self-esteem as their research design appears to be one of the best to date. While their results may not be unequivocally significant, the cardiovascular group did show a greater effect on psychological functioning than did controls. Keeping in mind that the control

group did experience some cardiovascular benefit, it is not surprising that their results were not very dramatic. On the basis of their experimental design, Goldwater and Collis conclude that improvements in physical fitness produce benefits in psychological wellbeing.

Goldwater and Collis raise the question of whether the psychological benefit reflects perceived improvement or actual improvement. They found that while both groups perceived themselves to be fit, the experimental group's saw themselves as being more fit than the controls and this correlated with their greater physical improvement.

While some researchers suggest that there exists a direct, physical source for causation on psychological variables, other researchers such as Heaps (1978) propose that these same psychological variables are determined primarily by cognitive interpretations of body reactions. Heaps, using Schacter's cognitive-physiological interactional theory of emotion, contends that cognitions about one's physical functioning develop and change through exposure to physical and social standards of comparison. Furthermore, these cognitive evaluations influence psychological behavior. Thus, Heaps set out to study the relative relationship of actual and perceived fitness to psychological functioning and the relative influence of social and physical standards of self comparison of bodily functioning. Heaps found that the subjects' estimates of physical fitness were influenced by both the social and physical standards of self comparison that were available to them. Subjects' perceptions of their fitness levels were positively related to feelings of self acceptance and negatively related to anxiety about bodily functioning. In addition, Heaps found that the subjects' actual fitness levels were only slightly correlated to self-estimates of fitness. Heaps interpreted these findings to mean that psychological benefits following fitness training result form the cognitive and emotional perception of physical fitness and not from actual physical improvement. However, there are alternative explanations.

One might speculate that Heaps' study only pertains to the acute effects of physical activity. The subjects were not put through a training program of sufficient intensity and duration and thus cardiovascular training effects were not established. Furthermore, consistent with Schacter's model, ambiguous bodily states lead one to rely more heavily on external sources such as social and physical comparisons. It can be argued that since the subjects did not undergo training they were unaware of such factors as perceived exertion and did not know the limits of their cardiovascular endurance. Thus, consonant with Schacter's model, the subjects in such an

"ambiguous state" as a one trial run tended to rely more heavily on feedback from their environment. Conversely, those people who engage in chronic physical activity have more experience with the effect of exercise training and the integration of their physical functioning into their self perception. Thus, they tend to rely less heavily on environmental feedback.

Sonstroem (1984), in a review of the literature on physical fitness training and self-esteem, concludes, "... exercise programs are associated with significant increases in the self-esteem scores of participants"(p. 145). These findings are especially applicable to participants with initially low levels of self-esteem. Sonstroem contends that the consistent replication of these results mitigates the limitations of many design inadequacies. He is careful to limit his conclusion to exercise programs rather than fitness changes and self-esteem scores rather than the global concept of self-esteem. Sonstroem maintains that we must develop an understanding of the exercise program agents, such as goal achievement, increase in physical fitness, social experiences, sense of competence or mastery, feelings of somatic wellbeing and adoption of associated health behaviors, experimental attention, and the reinforcement of significant others. Thus, while it appears that exercise training programs are associated with increased self-esteem scores, it still remains unclear whether these scores represent enduring components of self-concept.

Direct causal evidence of the relationship between self-esteem and exercise has yet to be established by current research. Sonstroem proposes that the paucity of empirical evidence supporting the relationship between self-esteem and fitness training have been partially due to the use of global measures of self-esteem. Sonstroem argues against only global measures based on the belief that self-concept is a multifaceted construct and is often situation specific. He endorses a model proposed by Shavelson, Hubner, and Stanton (1976), which states that self-concept structure is "multifaceted and heirarchically organized on a continuum of situation specificity and consequent stability" (p.147). Thus, self-concept at the bottom of the heirarchy is more situation specific and more amenable to change. In order to influence self-concept, many specific conceptions at the bottom of the heirarchy must be altered.

Folkins and Sime (1981), Layman (1974) and Sonstroem (1984) all point out that the preponderance of pre-experimental and quasi-experimental research designs with the associated dangers to internal and external validity plague research on the psychological effects of physical fitness training. Campbell and Stanely (1963)

outline eight threats to internal validity: 1) testing, 2) selection bias, 3) history, 4) maturation, 5) statistical regression, 6) differential subject selection, 7) experimental mortality, 8) selection-maturation interaction; and four threats to external validity: 1) the interactive effects of testing, 2) experimental arrangements, 3) selection biases, 4) multiple treatments. These threats to validity may provide explanations for alternative research findings. The research designs employed include pre-experimental, quasi-experimental and experimental and are presented in ascending order of control over extraneous variables (Sonstroem, 1984). At the time of Folkins and Sime's (1981) review, approximately 50% of the studies reviewed used pre-experimental designs and only 15% used experimental designs. At the time of Sonstroem's (1984) review, only 25% of the studies on self-esteem and exercise employed experimental designs. Folkins and Sime (1981) point out that while quasi-experimental and true experimental designs provide the best evidence for the relationship between physical fitness and mental health, these studies are also fraught with difficulties.

## CHAPTER II

## IMPLICATIONS OF LITERATURE REVIEW

Behavioral treatments have often neglected the role of exercise and emotions in weight loss and weight loss maintenance. Furthermore, while the role of behavioral techniques in social support groups has been studied, there have been no studies combining social support groups with exercise in the treatment of obesity using adequate experimental design. In addition, it appears that many studies that have attempted to research the areas of weight loss, exercise and self-esteem have either used inadequate controls, innappropriate measures of self-esteem or insufficient measures of physical fitness. The present study is designed to overcome some of these limitations. This study will examine the effects of participation in a weight loss program employing social support and exercise on self-esteem.

## HYPOTHESIS

I. At the conclusion of the treatment program, subjects in the exercise plus social support group, or the full treatment group (FT), will have higher scores on a set of physical fitness measures than will subjects in the exercise-only treatment group (EO) or the waiting list control group (CG). Moreover, it is expected that EO subjects will display higher scores on these measures than CG subjects. The hypothesized relations among the groups can be represented as follows:

$$FT > EO > CG$$

The physical fitness measures consist of five variables, which will be tested for univariate effects. These five variables are:

1. Weight, examined in this study as pounds weighed.
2. Cardiovascular functioning, depicted here as heart rate response to the Bench Step Test.
3. Abdominal strength and low back function, represented by situp capability.
4. Body Fat, examined in terms of body fat percentages
5. Flexibility, examined in terms of the ability to sit and reach.

II. It is also hypothesized that, at the conclusion of the treatment program, the FT will show increased scores on measures of self-esteem compared to the other two groups and that EO subjects will show greater increases in self-esteem than CG subjects. Again, the hypothesized relations among the groups can be represented as follows:

$$FT > EO > CG$$

III. It is expected that the social support functions of the the FT intervention will help reduce dropout from the program as a whole. The rationale for this prediction is that group members will provide support and encouragement for members to continue their participation. It is expected that there will be no difference in attrition between the other two groups. The hypothesized relations for program dropout are:

$$FT > EO, CG$$

and

$$EO = CG$$

CHAPTER III

# METHOD

## RESEARCH DESIGN

Overview: The present study was conducted in association with Ridgeview Psychiatric Hospital and Center of Oak Ridge, Tennessee.

Design: The design is a pre- and post- treatment experiment with three conditions (FT, EO, and CG) and matched controls prior to random assignment.

Subjects: Subjects were recruited from their response to a newspaper advertizement for an open forum entitled "Weight Loss and Wellness". All of the subjects were women and 82% of these women were married and fell between the ages of 29 and 62. All participants were required to obtain their physician's approval prior to entry into the program and sign an informed consent form that states they have this approval. There were originally 12 subjects in each condition (FT, EO and CG) for a total of 36 subjects. However, before the beginning of the program four subjects in the exercise only condition decided not to participate in the program and two other subjects who were willing to enter the program were placed in this group. Eventually, one subject dropped out of the Full Treatment (FT) condition, six dropped out from the Exercise Only (EO) condition and three dropped out from the Control Group (CG).

Subjects were required to pay an 18 dollar per week fee with a 25 dollar deposit. This deposit was returned if the subject met two requirements. The first requirement was designed to promote adherence and included attending 80% of the exercise classes (30 out of 36 classes) and support groups (10 out of 12 group meetings). The second requirement was designed to enhance commitment to the weight loss process and consisted of a weight loss contract. Each subject was encouraged to make a weight loss contract for a weekly weight loss not to exceed two pounds with one to one and a half pounds being the recommended weight loss to ensure safe and healthly dieting practices. The concept of developing contracts to promote adherence and commitment was taken from Martin and Dubbert (1982).

Procedure: The 12 week treatment phase included participation in either a FT (exercise plus social support condition), an EO (exercise only treatment condition) or a CG (waiting list control condition). The subjects underwent pre- and post- tests of

physical fitness and self-esteem.

The support group were geared toward talking about thoughts, feelings and behaviors related to eating, food and the psychological and physiological ramifications of being overweight. Each individual will was encouraged to explore his/her dynamics with regard to food and overeating with a special emphasis on the way in which food is used emotionally. For example, some individuals turn to food when they are depressed, angry, dissappointed or bored while others use food to compensate for loneliness or loss. Some people use food as an interpersonal buffer in order to keep others from getting close to them or feeling sexual toward them. As each individual explored the meaning of his/her eating behaviors, he/she was encouraged to find more adaptive solutions.

Another major function of the social support groups was to provide the emotional and interpersonal support necessary to make the kinds of changes that are needed for weight loss and weight loss maintenance and help the individual combat feelings of deprivation that are associated with dieting. The goal of the support groups was to help the individual obtain the help, support and comfort they had previously obtained from food and transfer the meeting of these needs to people. The final goal was to have people seek out help in their home environment. Information about dieting, exercise and eating habit change was also distributed.

The aerobic exercise classes met three times per week for a period of sixty minutes. It consisted of ten minutes of warm-up and cool-down exercises, 25 minutes of aerobic dance at 70% to 85% of maximal heart rate, and 15 minutes of exercises geared toward increasing muscle strength and flexibility.

Each subject was given a written diet consisting of 1200 calories that is recommended by the American Dietary Association based on their nutritional guidelines.

## MEASURES OF SELF-ESTEEM

Self-concept was measured by two instruments: A global measure of self-esteem developed by (Hudson, 1974) entitled "Index of Self-Esteem" and the Tennessee Self-Concept Scale (TSCS) developed by Fitts (1965).

Tennessee Self-Concept Scale (TSCS): The TSCS consists of 100 items based on a Likert Scale. Items include "I am an attractive person", "I have a healthy body", "I despise myself" and "I do not feel at ease with other people". Each item is based on a

five response format including: 1) Completely False, 2) Mostly False, 3) Partly False and Partly True, 4) Mostly True, 5) Completely True. The TSCS was chosen for several reasons. Physical therapists use this scale for gauging changes in individuals exposed to a conditioning program; the scale is standardized and can be self-administered in ten to twenty minutes; and subscales provide measures of physical, moral, social and family components of self-esteem as well as self-satisfaction, identity, self-criticism, and other personality categories. Specific subscales of the TSCS were chosen because physical therapists and psychologists have shown them to be sensitive to the effects of physical conditioning (Brinkman & Hoskins, 1979). These subscales include Identity, Physical Self, Personal Self, and Social Self.

Index of Self-Esteem: The Index of Self-Esteem is a global measure of self-esteem based on a Likert Scale. Items include "I feel I need more self-confidence", "I feel ugly", "I feel that I am a very competent person" and "I am a likable person". Each item was rated on a five point response format with the following verbal anchors: 1) "Rarely or None of the Time", 2) "A Little of the Time", 3) "Sometimes", 4) "A Good Part of the Time" and 5) "Most of the Time". This self report inventory was developed by Hudson (1974). It differs from the TSCS in that it gives a global score of general self-concept rather than subscales. It was employed in accordance with Sonstroem's (1984) recommendation that a global measure of self-esteem should be employed in conjunction with the TSCS.

## MEASURES OF PHYSICAL FITNESS

Bodyfat: Skinfold measurements were made of three body sites (triceps, abdomin and subscrapular) with calipers midway between the crest and base of the skinfold. The mean of three consecutive measurements was recorded and the sum of the three skinfolds were obtained. The Pollock ratings were used to determine the percentage of body fat. The principle investigator performed the body fat measurements which represents a weakness in the research design.

Flexibility: The Sit and Reach Tests were conducted after proper warm-up. The subjects' shoes were removed and the subject was instructed to sit with knees and arms fully extended and reach forward with palms down for four times and hold on the fourth time. Distances between hands and wall were then measured.

Abdominal Strength: Number of modified situps (flat on back with knees flexed,

heels 12 - 18 inches from buttocks with feet held by partner. Arms are crossed over chest) performed in 60 seconds. The participant was told that the objective is to do as many situps as possible in 60 seconds. The subject was instructed to curl to a sitting position with arms crossed and to go down until shoulder blades contact the floor. Number of situps performed is the score.

Cardiovascular Endurance: The Bench Step Test was conducted after recording resting heartrate and blood pressure and conducting practice steps. The subject steps up and down, leading with the same foot for two minutes. The subject then sits down and heartrate was then taken for 15" exactly 10" after stopping and is followed by blood pressure reading. The test is discontinued if heartrate is equal or greater than 85% of the maximum, systolic blood pressure is greater than 200 or the subject wants the test discontinued. If not, the subject proceeds to the next level.

Stage 1 = 12 steps per minute (3 steps every 15")
Stage 2 = 18 steps per minute (3 steps every 10")
Stage 3 = 24 steps per minute (2 steps every 5")

# CHAPTER IV

## RESULTS

An analysis of covariance was employed using the pretest as the covariate and the posttest as the criterion in order to factor out any pretest differences. Duncan's Multiple Range was then performed as a post hoc test on the adjusted means. The results of analysis of covariance indicate that there are significantly different changes on the following variables: Weight, Body Fat, Waist and Hip Girth measurements, Flexibility as measured by the "Sit and Reach Test", and Abdominal Strength as measured by the "Sit-Up Test". The means and standard deviations for the groups are listed in Table 1: Means and Standard Deviations. The results of the analysis of covariance are depicted in Table 2: Analysis of Covariance Summary.

As can be seen in Table 2, the reduction in body weight by the FT group was significantly different than the changes in body weight in the other two groups with the FT group losing more weight than the EO and CG. The EO group's change in body weight was not significantly different from the control group. The FT group demonstrated significantly greater reductions in body fat than the control group. Data for the EO group was unobtainable on this measure due to the unavailability of equipment. In addition to losing more weight and body fat, the FT group also evidenced significantly greater reductions in waist and hip girth measurements than was evidenced by the control group. The EO group was not significantly different than the FT and CG with regard to inches lost in hip and waist girth.

In terms of the physical fitness variables, there were significant differences in flexibility between all three groups with the EO group making the most gains in flexibility followed by the FT group who made significantly greater gains than the CG. The FT group demonstrated significantly greater increases in abdominal strength than the CG, but the EO group was not significantly different from either the CG or the FT group. There were no significant findings with regard to improvements in cardiorespiratory functioning or self-esteem measures although there were some trends noted that will be explored in the Discussion.

## TABLE 1: MEANS AND STANDARD DEVIATIONS

| | | Pretest Means | Standard Deviations | Posttest Means | Standard Deviations | N |
|---|---|---|---|---|---|---|
| **Weight** | | | | | | |
| | FT | 209.90 | 47.93 | 200.00 | 48.46 | 11 |
| | EO | 165.85 | 33.51 | 152.00 | 18.81 | 4 |
| | CG | 200.40 | 36.43 | 203.32 | 35.59 | 9 |
| **Body Fat** | | | | | | |
| | FT | 38.54 | 2.42 | 36.73 | 2.73 | 11 |
| | CG | 38.11 | 1.54 | 38.77 | 1.56 | 9 |
| **Waist Girth** | | | | | | |
| | FT | 38.40 | 8.28 | 36.09 | 6.73 | 11 |
| | EO | 31.50 | 5.58 | 28.25 | 2.50 | 4 |
| | CG | 37.10 | 5.19 | 37.33 | 5.07 | 9 |
| **Hip Girth** | | | | | | |
| | FT | 48.10 | 6.59 | 45.36 | 6.52 | 11 |
| | EO | 41.83 | 5.34 | 39.00 | 2.44 | 4 |
| | CG | 45.80 | 7.13 | 47.78 | 5.62 | 9 |
| **Sit & Reach** | | | | | | |
| | FT | 22.90 | 7.40 | 28.09 | 8.00 | 11 |
| | EO | 26.14 | 4.87 | 37.50 | 12.15 | 4 |
| | CG | 24.90 | 7.04 | 26.11 | 6.43 | 9 |
| **Sit Up** | | | | | | |
| | FT | 8.45 | 9.41 | 18.09 | 10.72 | 11 |
| | EO | 19.42 | 10.87 | 26.00 | 18.24 | 4 |
| | CG | 11.10 | 13.22 | 12.00 | 12.52 | 9 |
| **Resting Heart Rate** | | | | | | |
| | FT | 82.00 | 6.51 | 79.00 | 9.78 | 11 |
| | EO | 77.71 | 7.25 | 83.00 | 12.80 | 4 |
| | CG | 85.60 | 10.36 | 86.44 | 11.99 | 9 |
| **Resting Systolic Blood Pressure** | | | | | | |
| | FT | 132.90 | 19.62 | 118.46 | 13.44 | 11 |
| | EO | 112.28 | 13.92 | 112.50 | 15.60 | 4 |
| | CG | 123.77 | 11.55 | 119.89 | 13.08 | 9 |
| **Resting Diastolic Blood Pressure** | | | | | | |
| | FT | 78.55 | 9.17 | 72.82 | 9.08 | 11 |
| | EO | 72.57 | 9.21 | 69.50 | 10.38 | 4 |
| | CG | 78.22 | 9.87 | 74.33 | 10.46 | 9 |

TABLE 1 (Continued)

| | Pretest Means | Standard Deviations | Posttest Means | Standard Deviations | N |
|---|---|---|---|---|---|
| **Exercise Heart Rate Level One** | | | | | |
| FT | 112.20 | 16.09 | 103.80 | 28.11 | 10 |
| EO | 108.57 | 19.79 | 122.00 | 26.18 | 4 |
| CG | 116.00 | 25.85 | 136.50 | 18.94 | 8 |
| **Exercise Systolic Level One** | | | | | |
| FT | 152.80 | 30.83 | 132.80 | 25.00 | 10 |
| EO | 124.00 | 18.36 | 122.00 | 26.18 | 4 |
| CG | 138.66 | 15.94 | 136.50 | 18.94 | 8 |
| **Exercise Diastolic Level One** | | | | | |
| FT | 78.90 | 11.89 | 71.60 | 7.41 | 10 |
| EO | 74.29 | 7.34 | 69.50 | 7.00 | 4 |
| CG | 78.44 | 9.10 | 61.86 | 25.12 | 8 |
| **Exercise Heart Rate Level Two** | | | | | |
| FT | 125.14 | 8.47 | 107.75 | 10.17 | 8 |
| EO | 126.33 | 8.04 | 115.00 | 15.79 | 4 |
| CG | 137.50 | 24.86 | 105.71 | 48.58 | 7 |
| **Exercise Systolic Level Two** | | | | | |
| FT | 147.43 | 26.58 | 134.25 | 17.61 | 8 |
| EO | 134.00 | 23.93 | 125.00 | 28.12 | 4 |
| CG | 146.25 | 14.28 | 123.71 | 50.01 | 7 |
| **Exercise Diastolic Level Two** | | | | | |
| FT | 75.00 | 10.63 | 70.75 | 7.40 | 8 |
| EO | 73.00 | 6.54 | 69.50 | 6.19 | 4 |
| CG | 77.00 | 7.40 | 61.86 | 25.12 | 7 |
| **Exercise Heart Rate Level Three** | | | | | |
| FT | 142.40 | 14.31 | 119.74 | 15.16 | 7 |
| EO | 146.00 | 13.42 | 134.00 | 9.52 | 4 |
| CG | 148.00 | 13.85 | 107.67 | 85.15 | 3 |
| **Exercise Systolic Level Three** | | | | | |
| FT | 157.60 | 25.27 | 138.00 | 17.73 | 7 |
| EO | 138.00 | 23.70 | 136.50 | 29.04 | 4 |
| CG | 163.50 | 10.63 | 106.78 | 78.71 | 3 |

**TABLE 1 (Continued)**

| | Pretest Means | Standard Deviations | Posttest Means | Standard Deviations | N |
|---|---|---|---|---|---|
| **Exercise Diastolic Level Three** | | | | | |
| FT | 79.00 | 11.62 | 70.28 | 8.75 | 7 |
| EO | 73.20 | 6.72 | 72.50 | 8.06 | 4 |
| CG | 82.00 | 9.66 | 53.33 | 39.31 | 3 |
| **Recovery Heart Rate** | | | | | |
| FT | 89.60 | 10.15 | 82.22 | 6.11 | 9 |
| EO | 83.00 | 3.83 | 83.50 | 4.12 | 4 |
| CG | 88.75 | 9.43 | 83.12 | 8.77 | 8 |
| **Recovery Systolic** | | | | | |
| FT | 133.20 | 18.79 | 120.44 | 16.02 | 9 |
| EO | 121.00 | 14.09 | 111.00 | 16.53 | 4 |
| CG | 126.25 | 7.51 | 123.75 | 14.83 | 8 |
| **Recovery Diastolic** | | | | | |
| FT | 78.30 | 9.21 | 72.00 | 6.63 | 9 |
| EO | 79.50 | 9.00 | 70.50 | 9.57 | 4 |
| CG | 79.25 | 7.80 | 75.00 | 10.84 | 8 |
| **Total Positive** | | | | | |
| FT | 334.00 | 31.17 | 342.00 | 29.96 | 8 |
| EO | 331.83 | 14.97 | 344.66 | 6.11 | 3 |
| CG | 338.70 | 34.45 | 358.14 | 28.16 | 7 |
| **Self-Identity** | | | | | |
| FT | 120.82 | 10.90 | 123.86 | 11.04 | 8 |
| EO | 124.67 | 3.78 | 124.67 | 3.79 | 3 |
| CG | 123.10 | 13.17 | 128.00 | 7.59 | 7 |
| **Self-Satisfaction** | | | | | |
| FT | 102.73 | 13.72 | 106.25 | 13.14 | 8 |
| EO | 99.83 | 6.91 | 111.00 | 3.61 | 3 |
| CG | 102.90 | 14.11 | 111.57 | 14.03 | 7 |
| **Behavior** | | | | | |
| FT | 110.46 | 8.88 | 111.87 | 8.00 | 8 |
| EO | 107.33 | 6.28 | 109.00 | 6.56 | 3 |
| CG | 114.70 | 12.76 | 117.71 | 7.09 | 7 |
| **Physical Self** | | | | | |
| FT | 56.90 | 9.51 | 61.75 | 6.81 | 8 |
| EO | 62.33 | 5.57 | 66.67 | 3.78 | 3 |
| CG | 57.80 | 8.26 | 61.14 | 8.97 | 7 |

**TABLE 1 (Continued)**

| | Pretest Means | Standard Deviations | Posttest Means | Standard Deviations | N |
|---|---|---|---|---|---|
| **Morality** | | | | | |
| FT | 76.18 | 7.31 | 73.50 | 5.18 | 8 |
| EO | 73.33 | 6.28 | 72.67 | 4.62 | 3 |
| CG | 76.40 | 8.26 | 78.27 | 2.87 | 7 |
| **Personal Self** | | | | | |
| FT | 61.73 | 7.53 | 64.63 | 8.25 | 8 |
| EO | 62.50 | 7.94 | 64.67 | 7.51 | 3 |
| CG | 62.60 | 8.62 | 69.43 | 6.29 | 7 |
| **Family Self** | | | | | |
| FT | 71.27 | 6.94 | 70.88 | 7.99 | 8 |
| EO | 67.16 | 5.26 | 72.00 | 3.61 | 3 |
| CG | 70.70 | 10.94 | 74.43 | 6.48 | 7 |
| **Social Self** | | | | | |
| FT | 69.72 | 8.00 | 71.25 | 7.19 | 8 |
| EO | 66.50 | 5.16 | 68.67 | 3.06 | 3 |
| CG | 71.20 | 8.59 | 74.86 | 6.91 | 7 |
| **Total Variability** | | | | | |
| FT | 48.91 | 12.12 | 44.75 | 10.50 | 8 |
| EO | 49.16 | 11.81 | 38.00 | 16.09 | 3 |
| CG | 50.20 | 12.98 | 40.85 | 10.64 | 7 |
| **Distribution Score** | | | | | |
| FT | 107.36 | 32.11 | 104.75 | 32.44 | 8 |
| EO | 102.16 | 25.94 | 99.33 | 8.39 | 3 |
| CG | 117.30 | 21.70 | 124.00 | 16.81 | 7 |
| **Total Conflict** | | | | | |
| FT | 27.82 | 10.83 | 30.25 | 5.99 | 8 |
| EO | 29.83 | 9.47 | 28.66 | 11.55 | 3 |
| CG | 29.20 | 9.48 | 27.14 | 7.40 | 7 |
| **Index of Self-Esteem** | | | | | |
| FT | 92.55 | 13.83 | 98.25 | 9.00 | 8 |
| EO | 90.40 | 15.14 | 99.66 | 15.56 | 3 |
| CG | 98.61 | 16.38 | 104.14 | 13.61 | 7 |

## TABLE 2: ANALYSIS OF COVARIANCE SUMMARY

| | Post Adjusted Means | Anacova F Value | df | Overall Significance | Significant Findings* |
|---|---|---|---|---|---|
| **Weight** | | | | | |
| FT | 186.95 | 5.30 | 2,19 | .0148 | CG, EO >FT |
| EO | 196.97 | | | | |
| CG | 197.73 | | | | |
| **Body Fat** | | | | | |
| FT | 36.52 | 54.83 | 1,17 | .0001 | CG>FT |
| CG | 39.03 | | | | |
| **Waist** | | | | | |
| FT | 34.34 | 3.68 | 2,19 | .0447 | CG>FT |
| EO | 34.92 | | | | CG, EO |
| CG | 36.21 | | | | EO, FT |
| **Hips** | | | | | |
| FT | 43.37 | 6.74 | 2,19 | .0061 | CG>FT |
| EO | 44.42 | | | | CG, EO |
| CG | 47.39 | | | | EO, FT |
| **Sit and Reach** | | | | | |
| FT | 30.52 | 14.02 | 2,19 | .0002 | CG<FT<EO |
| EO | 36.39 | | | | |
| CG | 24.81 | | | | |
| **Sit Up** | | | | | |
| FT | 21.05 | 6.05 | 2,20 | .0088 | CG<FT |
| EO | 17.20 | | | | CG, EO |
| CG | 12.73 | | | | EO, FT |
| **Resting Heart Rate** | | | | | |
| FT | 80.18 | 1.49 | 2,20 | .2495 | FT, EO, CG |
| EO | 85.26 | | | | |
| CG | 84.01 | | | | |
| **Resting Systolic Blood Pressure** | | | | | |
| FT | 114.11 | 1.33 | 2,19 | .2884 | FT, EO, CG |
| EO | 121.13 | | | | |
| CG | 120.53 | | | | |
| **Resting Diastolic Blood Pressure** | | | | | |
| FT | 71.55 | 1.25 | 2,19 | .3091 | FT, EO, CG |
| EO | 75.03 | | | | |
| CG | 74.86 | | | | |

TABLE 2 (Continued)

| | Post Adjusted Means | Anacova F Value | df | Overall Significance | Significant Findings* |
|---|---|---|---|---|---|
| **Exercise Heart Rate Level One** | | | | | |
| FT | 102.86 | 1.25 | 2,17 | .3125 | FT, EO, CG |
| EO | 99.81 | | | | |
| CG | 111.74 | | | | |
| **Exercise Systolic Level One** | | | | | |
| FT | 124.75 | 1.95 | 2,17 | .1722 | FT, EO, CG |
| EO | 135.41 | | | | |
| CG | 138.40 | | | | |
| **Exercise Diastolic Level One** | | | | | |
| FT | 69.94 | .15 | 2,17 | .8653 | FT, EO, CG |
| EO | 73.26 | | | | |
| CG | 68.36 | | | | |
| **Exercise Heart Rate Level Two** | | | | | |
| FT | 111.68 | .78 | 2,13 | .4770 | FT, EO, CG |
| EO | 118.84 | | | | |
| CG | 97.15 | | | | |
| **Exercise Systolic Level Two** | | | | | |
| FT | 128.92 | .31 | 2,13 | .7415 | FT, EO, CG |
| EO | 131.52 | | | | |
| CG | 116.54 | | | | |
| **Exercise Diastolic Level Two** | | | | | |
| FT | 69.17 | .76 | 2,13 | .4857 | FT, EO, CG |
| EO | 71.60 | | | | |
| CG | 61.06 | | | | |
| **Exercise Heart Rate Level Three** | | | | | |
| FT | 123.12 | 1.89 | 2,6 | .2307 | FT, EO, CG |
| EO | 132.43 | | | | |
| CG | 73.04 | | | | |

TABLE 2 (Continued)

| | Post Adjusted Means | Anacova F Value | Df | Overall Significance | Significant Findings* |
|---|---|---|---|---|---|
| **Exercise Systolic Level Three** | | | | | |
| FT | 121.05 | 1.95 | 2,6 | .2225 | FT, EO, CG |
| EO | 150.59 | | | | |
| CG | 71.48 | | | | |
| **Exercise Diastolic Level Three** | | | | | |
| FT | 64.53 | 3.57 | 2,6 | .1148 | CG<EO |
| EO | 77.67 | | | | EO, FT |
| CG | 41.16 | | | | FT, EO |
| **Recovery Heart Rate** | | | | | |
| FT | 80.74 | 1.40 | 2,13 | .2809 | FT, EO, CG |
| EO | 85.74 | | | | |
| CG | 86.81 | | | | |
| **Recovery Systolic** | | | | | |
| FT | 118.14 | .71 | 2,13 | .5080 | FT, EO, CG |
| EO | 121.56 | | | | |
| CG | 127.93 | | | | |
| **Recovery Diastolic** | | | | | |
| FT | 71.51 | 2.50 | 2,13 | .1206 | CG>FT |
| EO | 76.37 | | | | EO, CG |
| CG | 79.61 | | | | EO, FT |
| **Total Positive** | | | | | |
| FT | 354.08 | 1.55 | 2,14 | .2457 | FT, EO, CG |
| EO | 352.85 | | | | |
| CG | 340.82 | | | | |
| **Self-Identity** | | | | | |
| FT | 129.65 | 2.52 | 2,14 | .1166 | FT, EO, CG |
| EO | 122.57 | | | | |
| CG | 122.30 | | | | |
| **Self-Satisfaction** | | | | | |
| FT | 109.31 | 1.53 | 2,14 | .2496 | FT, EO, CG |
| EO | 115.40 | | | | |
| CG | 106.18 | | | | |
| **Behavior** | | | | | |
| FT | 114.30 | .12 | 2,14 | .8901 | FT, EO, CG |
| EO | 113.47 | | | | |
| CG | 113.03 | | | | |

**TABLE 2 (Continued)**

| | Post Adjusted Means | Anacova F Value | Df | Overall Significance | Significant Findings* |
|---|---|---|---|---|---|
| **Physical-Self** | | | | | |
| FT | 64.43 | 1.01 | 2,14 | .3893 | FT, EO, CG |
| EO | 64,03 | | | | |
| CG | 59.22 | | | | |
| **Morality** | | | | | |
| FT | 73.68 | 2.15 | 2,14 | .1532 | FT, EO, CG |
| EO | 74.11 | | | | |
| CG | 77.46 | | | | |
| **Personal-Self** | | | | | |
| FT | 67.07 | .24 | 2,14 | .7889 | FT, EO, CG |
| EO | 65.18 | | | | |
| CG | 66.41 | | | | |
| **Family Self** | | | | | |
| FT | 71.88 | 1.04 | 2,14 | .3784 | FT, EO, CG |
| EO | 76.00 | | | | |
| CG | 71.57 | | | | |
| **Social-Self** | | | | | |
| FT | 72.56 | .05 | 2,14 | .9481 | FT, EO, CG |
| EO | 71.61 | | | | |
| CG | 72.09 | | | | |
| **Total Variability** | | | | | |
| FT | 44.67 | .53 | 2,14 | .6017 | FT, EO, CG |
| EO | 37.29 | | | | |
| CG | 41.24 | | | | |
| **Distribution Score** | | | | | |
| FT | 113.92 | .24 | 2,14 | .7871 | FT, EO, CG |
| EO | 109.97 | | | | |
| CG | 108.95 | | | | |
| **Total Conflict** | | | | | |
| FT | 31.27 | 1.58 | 2,14 | .2403 | FT, EO, CG |
| EO | 28.17 | | | | |
| CG | 26.19 | | | | |
| **Index of Self Esteem** | | | | | |
| FT | 105.55 | 2.82 | 2,14 | .0932 | FT, EO, CG |
| EO | 100.89 | | | | |
| CG | 95.27 | | | | |

# CHAPTER V

## DISCUSSION

The present study was designed to provide a weight-loss program that takes the dieter's psychological and physical wellbeing into account. The relative contributions of social suport and exercise in the weight loss process were also assessed. Many people spend a tremendous amount of money and time on the dieting process while also putting their health at risk for the sake of losing weight. The inevitable failures of fad diets result in feelings of guilt, depression and self-hatred. Furthermore, these dieters actually damage their health increasing the risk of cardiovascular dysfunction, cancer and damage to the digestive system. Thus, the comprehensive weight loss treatment program is designed to promote healthy dieting behavior through good nutrition and aerobic exercise as well as attending to the psychological factors that are involved in becoming overweight, losing that weight and maintaining the loss. The philosophy of the program is based on the idea that if one does not understand the emotional factors involved in overeating, weight loss will involve only temporary symptom relief and not permanent adaptive changes. The rationale behind the treatment program is based on the idea that along with the external changes associated with weight loss, one must also make internal changes such as learning how to nurture the self in ways that don't involve food.

Although the present study doesn't elucidate causal mechanisms associated with weight loss, physical fitness and their impact on self-esteem, it does provide information as to whether the treatment had an effect. It appears that the weight loss program employed in the current study had a significant effect on weight loss but not on other variables such as cardiovascular functioning and self-esteem. Furthermore, it may be that social support groups geared toward understanding the emotional factors underlying overeating and obesity may help individuals gain insight and control over their eating behaviors but these changes either did not impact on self-esteem or the measures employed were not sensitive enough to their effects. In addition, no conclusions can be made with regard to the nonspecific effects of traditional social support versus social support focused on understanding the emotional factors underlying overeating.

Individuals in the full treatment and exercise only group made the most improvements in their physical fitness status compared to individuals in the control group particularly on those variables that did not relate to cardiovascular functioning. Not only did individuals in the full treatment condition lose more weight than subjects in the control condition, but they lost more storage fat than those in the control condition. This is important because if one were to diet without exercising, weight loss could be attributed to a loss of lean body mass or muscle as well as fat. Measuring losses in body fat is a more accurate means of assessing the efficacy of weight control programs than using weight loss alone based on these factors. Subjects in the full treatment group also lost more inches in their waist and hip girth measurements than subjects in the exercise only or control condition. Many of these subjects reported than they were surprised at the changes in their body size given their relatively small weight losses (x=10 lbs).

In addition to these reductions in weight and body fat, the full treatment subjects also demonstrated greater increases on other physical fitness variables including flexibility, and low back function with nonsignificant improvements in cardiorespiratory functioning. Given the health precautions associated with obesity the current exercise program was tailored to the health needs of the sample population. This required an exercise program of moderate intensity were subjects were encouraged not to exceed 75% of their submaximal heart rate. Thus, the modified intensity of the program coupled with it's relatively short duration may account for the lack of significant results in terms of cardiorespiratiory functioning. It may be that a program of 16 weeks would be necessary to acheive the desired results.

The current weight loss program has several limitations. The most important of these limitations is the lack of generalizability of effects particularly in terms of self-esteem and cardiovascular functioning. It appears that the treatment program was not of sufficient intensity or duration to produce broad spectrum changes. Future research should be geared toward increasing the duration of both the exercise program and the social support groups. A twelve week format may not be long enough to impact on cardiovascular functioning when it consists of low to moderate intensity aerobic exercise. Furthermore, it may be that social support groups provide only insight into the reasons for overeating whereas individual therapy geared toward insight and countering resistance may be needed for long-term changes in self-esteem. Preliminary research on subjects who have been in the

program for one year indicate that while in treatment weight loss can be continued and maintained, and that self-esteem scores show improvement.

Given the limited nature of the current findings, there are several avenues for the future exploration of weight loss and its relationship to self-esteem. In order to assess whether a more powerful psychological treatment method is called for in order to influence weight and self-esteem, the differential effects of social support versus individual psychotherapy should be explored. One problem in the current program's social support groups is the limited opportunity to challenge the participant's resistance as would be possible in individual psychotherapy. It would also appear that individual's might be able to make more deep-seated changes in the context of a more intensive treatment approach in which the therapeutic alliance could provide some of the soothing and nurturing functions that were previously acheived through overeating. Furthermore, a longer exercise program should be enlisted in order to greater impact on cardiovascular functioning. Thus, future research should be geared toward employing a longer exercise training program with subjects being randomly assigned to a social support condition, an individual psychotherapy condition and a control condition to assess the effects of social support versus individual psychotherapy.

While there is no "hard data" to support the following hypotheses, a good deal of rich clinical material emerged from the content of the social support groups. Many of the subjects in this study reported that they were able to gain control and awareness into their relationships with food that was previously nonexistent for them. The support groups were geared to help each individual find out how they relate to food and how they abuse that relationship. For example, many of the women in the study had great difficulty expressing anger or asserting their needs in relationships. Often times these individuals would notice that being angry without expressing that anger or being dissappointed in a relationship without expressing the dissappointment would often precipitate a binge. These events would usually occur several times through the course of the program in the context of a psychological environment (the social support groups) that stressed the importance of finding the emotional and interpersonal aspects of overeating before an individual could adopt a more adaptive coping mechanism. It appeared that when the individual would make a change in their coping style from overeating in response to these emotions to actively trying to get what they needed from their relationships, a sense of control and competency would often ensue. However, these internal changes can not be

supported by the current data since they did not influence self-esteem scores. Many of these individuals would report an increase in the quality of their relationships when they made an attempt to handle the problems in the relationship directly rather than through overeating. The changes in the quality of relationships were often formulated in terms of "getting nurturance from relationships rather than from food". In addition to gaining some control over their eating and insight into the reasons for overeating many subjects reported that they learned a great deal about themselves and their roles in relationships. It must be repeated that the following section is based soley on clinical observation and the work of recent psychodynamic writers rather than experimental evidence. The clinical material that emerged from the social support groups suggested that one of the important internal or psychological changes many subjects experienced appears to be related to feelings of deprivation and the need for the emotional nurturance of the self.

## OVERWEIGHT AND UNDERFED: THE CLINICAL AND THEORETICAL IMPLICATIONS OF OVEREATING

When one looks at the psychological dynamics of overeating certain paradoxes become evident. One of these paradoxes is the idea that having a fat person go on a strict diet is like throwing gasoline on a blazing fire. Deprivation, be it emotional or physical, is part of the problem, not part of the solution. Stated another way , if a fat person wasn't already feeling deprived they wouldn't be fat in the first place. Despite the large quantity of food these people eat they are still hungry. They are still hungry because they are hungry for the nurturance food can never bring. Trying to meet an intangible emotional need with a tangible substance such as food can never be satisfying. What this does is disguise the need rather than meet it.

Here lies the concept that overweight people are, in a sense, underfed. They are underfed because the sustinance they need is emotional, not physical. When an individual's emotional needs for love, comfort, soothing and holding go unmet there is a need left to be filled. This emotional neediness is often experienced as a type of physical hunger that occurs in the absence of physiological need. It may be that eating is a coping strategy that is learned before the development of verbal skill when many of the infants' needs were met with food.

As newborns, the first interpersonal event we engage in centers around feeding. In addition to physical nurturance, a good deal of emotional nurturance is associated

with the process. The mother serves as the soother, comforter, and protector. Alot of information gets communicated during the feeding process. Comfort, love, safety and security all get communicated on a preverbal level. It is not surprising then, given the preverbal nature of this process, that when we seek to comfort ourselves with food it feels almost like an instinctual pull, an unconscious drive. It is also not surprising given this emotional bond to food that overeating in the face of emotional discomfort is such a difficult habit to break.

While most infants get comforted and soothed by feeding, not all become overweight. It may be that in the overweight person's emotional life food is overvalued for it's comforting functions. Perhaps instead of meeting the child's emotional needs with empathy, food was used to comfort and assuage the pain. For example, a child has a bad day at school and perhaps experiences some failure as well as rejection. Instead of recognizing the emotional pain and dissappointment, the child is offered a cookie because in recognizing the other's pain one must also feel their pain. Rather than paying the high price of empathy the caretaker gives the child food as if it were a pill designed to kill the pain. In some ways overweight people use food to help them escape from painful feelings by masking the painful feeling with a full feeling.

Hilda Bruch (1973) contends that overweight people cannot distinguish hunger from other bodily and emotional states. She proposes that one of the common traits in the dynamics of obese patients is the inability to recognize hunger and distinguish it from other other bodily and emotional sensations. Bruch (1985) believes that in the course of development overweight individuals misperceive their bodily sensations so that the "nutritional function can be misused in the service of complex emotional and interpersonal problems" (p.50). These "misperceptions" occur in the context of an interpersonal environment that is poorly attuned to the infants' needs. She asserts that while the families of eating disordered patients look at least superficially as though they take care of their child's physical and emotional needs, they neglect the expression of the child's true needs, wants and feelings. Bruch goes on to say that when the child's needs (especially the need for food) are not responded to in a consistent and regular fashion it deprives the child of the essential groundwork for "body identity". Thus, the infant does not learn how to distinguish it's emotional and interpersonal needs from it's physiological needs, which results in feelings of confusion about bodily awareness. Bruch attributes this inability to differientiate physiological needs from emotional needs to unempathic mothering. If

the infants' needs were responded to appropriately based on the actual need of the infant, then the infant would be able to make the distinction among it's needs and become more attuned with it's bodily states. However, if the mother superimposed her own faulty perception of the child's needs rather than determining what the infant actually needed, the inability to distinguish the emotional from the physiological would ensue. She contends that while some writers propose that obese patients do not having any "willpower", in actuality it would be impossible for them to exercise "control over a function or need which is not even recognized"(p.45).

Eating is a pleasureable distraction that can border on a dissociative state. In the course of eating people can forget about their psychic pain and their emotional needs and focus on the task at hand: incorporation of a good (tasting) object. In the mist of a binge, people can forget not only their pain and needs but also become unaware of the taste, texture, temperature and even quantity of the food. The only thing in conscious awareness is the process of taking in food. In some ways food is to unconscious emotional and interpersonal needs as Valium is to anxiety. It masks the feeling rather than addressing it's true meaning as a form of self-expression. It may be that food and eating represents a defense against painful affects that are intolerable to conscious awareness.

The feeling of being slightly full is a comfortable and satisfying feeling to those who have eaten because of physical hunger. The feeling of being slightly full to someone who has eaten because of emotional hunger is often a signal or stimulus to eat more because the emotional hunger is still there. Eating more and more serves to numb and disguise the pain of unmet emotional needs. Feeling uncomfortably full and possibly physically ill replaces the emotion that one was seeking to escape in the first place. Thus, the feeling of being numb and uncomfortably full is replaced by guilt, shame and self-hatred. In seeking to meet the needs of one's inner self, the self comes under attack.

What oftens happens in the overweight is that emotional or psychological problems are transformed into physical ones. In some way this is comforting in that there is the illusion that the reason for unhappiness is being overweight. That is, the person may say in essence, "I am unhappy because I am overweight and if I lose the weight I will be happy". In some ways this represents a failed attempt at externalization. It appears that many of these individuals can successfully lose weight, but as they reach their goal weight they discover that they are no happier

than they were before and gain the weight back. They gain the weight back because then they can maintain the illusion that their problem is a physical one and not a psychological one, as if to say "If I only had lost all of the weight and kept it off I would be happy". There is also an interpersonal correlate of this experience.

The interpersonal correlate of this experience seems to be "People don't like me because I'm fat. If I were thin people would find me attractive (nice, fun, pleasant, lovable)". As mentioned earlier many people who are overweight seem to have difficulty expressing their anger in a direct and constructive manner. It sometimes appears that some of these people express their anger in indirect and passive-aggressive ways. This can serve as a distancing device that prevents the person from forming close interpersonal relationships. One woman in a support group who employed this interpersonal style had lost a good deal of weight before the tenth week of the program. As it was she was not well liked by her support group owing to her passive-aggressive interpersonal style and was gently confronted with this several times. In the context of the support group she had the insight that she often felt that others did not like her because she was fat. She was confused because she was not liked any more despite her weight loss. She reported that she had dreams about gaining the weight back and being very relieved because she knew that people didn't like her because she was overweight and not because of her hostile interpersonal style. In the support group she was able to learn how to express her feelings in a much more constructive fashion rather than unsuccessfully trying to hide her anger over not getting what she needed from people. Thus, she overcame the illusion that people would like her if she lost weight without changing her hostile interpersonal style. Not only did this woman continue to lose weight but she reported that the general quality of all her significant relationships had improved because of her increased honesty and interpersonal skills.

Another common theme in the dynamics of many of the subjects was an inability to set firm limits and boundaries with others. An example of this would include playing the role of the caretaker to the exclusion of meeting one's own emotional needs. All of the participants in the study were women and most of these women were married with children. Many reported that they didn't have time to exercise or fix the reduced calorie, low fat meals recommended. The experience that seemed to be common to many of these women was that their needs were somehow secondary to the needs of their families. Their needs were not frivolous and in fact represented a danger to their health status. Yet these women still had trouble justifying the

amount of money and time they needed to invest in their health future. What became figural was an interpersonal style that was characterized by sacrificing one's own needs for the needs of others.

It is interesting to note that most eating disorders, that is, those disorders in which food is used emotionally such as obesity, bulimia and anorexia, occur in women. All of the subjects in the current study are women and most of these women seemed to have a common dynamic: they felt their needs were secondary to those of their families and while they were extremely good at nurturing others, at least on a superficial level, they were not very good at nurturing themselves emotionally. It seems that this dynamic is worth exploring both as a sociocultural phenomenon as well as an individual problem that may contribute to obesity and other eating disorders. Susie Orbach (1985) contends that "In studying and treating eating disorders one must take into account the psychological construction of femininity and the vicissitudes of the passage from girlhood to womanhood in contemporary society" (p. 83).

Eichenbaum and Orbach (1983) propose that within the family structure and the mother-daughter relationship, the female child learns her social role while she simultaneously develops her sense of self. Orbach (1985) asserts that the psychological requirements of successful femininity for adult women are based on three basic demands. The first of these demands is that women must defer to others. The second demand is that women must anticipate and meet the needs of others. The third demand is that women must seek self-definition through connection with another. As a consequence of these demands women must deny themselves and their needs. This results in an inability to develop an authentic sense of their true needs or feel entitled to have those needs met. Thus, these women often become dependent on the approval of those they take care of, and become preoccupied with the other's experience while neglecting their own feelings and needs. This leaves many aspects of the self underdeveloped. Eichenbaum and Orbach assert that under each competent caregiver there exists a hungry, deprived and needy little girl. The work of Orbach and Eichenbaum is consonant with others such as Hilda Bruch (1963, 1977, 1985), Dorothy Jones (1985) and Geneen Roth (1985). Eating disordered patients are often out of touch with their own feelings and have a tenuous sense of self that is based on the needs of the other. Eating is both an attempt to meet these unmet and unspecified emotional needs as well as a distraction from the pain of these unmet needs.

Why then do these unmet emotional needs and a fragile sense of self seek expression through food and eating? One major factor seems to be early learning experiences where the infant and child's emotional and physical needs were indiscriminantly met with feeding. Another factor may be that femininity is inextricably tied to feeding, food and food preparation. Orbach (1985) contends that immediately following World War II with it's post-war economy, motherhood was "elevated to almost saintly proportions"(p. 84). As part of the role of housewife and mother, food preparation plays an integral part in nurturing and maintaining the family. In addition, providing these functions became an important dimension of women's self-esteem. Orbach states that food then becomes a statement of the woman's love, power and giving in the family:

> Food personified the mother, and she was rejected or accepted through it . In this way, food became divorced from its biological function and took on this highly reified meaning. It was the conveyor belt for all manner of feelings expressed among family members.....We must take into account that throughout history, women's feeding others has been coupled with the necessity for self-denial....And yet women still have to hold back their desires for food, because food that a women prepares in an expression of love and nurturance for others is a far more dangerous commodity for the women herself. What do I mean by proposing this? At various stages in history and in different societies, woman's body has had to conform to the local culture's idea of what constitutes sexual attractiveness" (Orbach, 1985, p. 86-87).

So it appears that food becomes a double-edged sword. It is a means for nurturing others and an indirect attempt to nurture the self when real emotional needs are not in conscious awareness . Yet, if a women overindulges and becomes fat she pays the high price of losing her sexual attractiveness and her self-esteem suffers accordingly. In a society that is so greatly influenced by mass media it appears that since the late sixties, women's bodies as portrayed in television and magazines are becoming thinner and thinner. " Gone are the bosoms of the 1950s; spiraling angularity is *a la mode* today. Whereas 50 years ago a woman might bemoan the fact that her body didn't 'go in and out' as she desired, no woman today can rest assured in the knowledge that she has a good figure, for no woman today has the right body for more than a season or two" ( Orbach, 1985, p.87).

This socio-cultural phenomenon has great implications for women, "normal" dieting behavior and the recent rise in the incidence of other eating disorders such as anorexia and bulimia. Kim Chernin (1985), in her book entitled "The Hungry Self", cites some pretty startling statistics. First comes the estimate that 1 in 250 girls between the ages of 16 and 18 years of age is suffering from anorexia and that other estimates place the numbers to be closer to 1 in 100 teenagers. The second important if not shocking statistic is that 1 in 5 college-age women is afflicted with bulimia. Since less than 8 percent of eating disorders occurs in males, Chernin argues that "in our time, eating disorders are a distinctive form of female suffering" (p.13).

The goal of the current program was not to perpetuate these kinds of conflicts on women. Rather the goals were such that a high value was placed on taking care of the self and meeting one's emotional and interpersonal needs in a constructive fashion. One way of taking care of the self was to develop a healthy and fit body independent of the size. It is not realistic to expect that all women can acheive an "ideal" body weight but it is realistic to expect them them to develop a lifestyle that reduces the health risks associated with obesity. It is also realistic to expect that these women can become more in touch with their emotional and interpersonal needs and subsequently find a more constructive and efficient means of meeting these needs.

Chernin (1985) proposes that eating and food represents one of the most serious concerns of women's lives. She contends that women's disordered relationship to food is an important means of uncovering the profound sense of ambivalence and guilt that are an integral part of female self-development. She asserts that women's "preoccupation with eating might well become the *royal road* to the unconscious that dreams provided for Freud. If this is true, we can understand our tendency to neglect and to trivialize the psychological meanings in our eating behavior as a means of turning away from aspects of our emotional life we have not yet dared to confront" (p. XIII). Chernin believes that when we stop trivializing women's relationship to food and "look beyond the surface of this obsession, we come straight up against the most spiritual and political and deeply psychological issues that women face today" (p. XIII).

Many of the women in the program reported that before entering the program, they would engage in a good deal of obsessive rumnination about how many calories they had consumed or what they could or could not eat throughout the day.

Furthermore, they would often place a value on themselves depending upon what they ate or did not eat: "I was bad today; I ate a candy bar or I was good today; I only ate salad". These women reported a change in their relationship to food as a result of the support group discussions. In the support groups, members were challenged to explore what food and eating meant to them. Instead of valueing themselves on what they did or did not eat they were challenged to view the need to overeat as an expression of the self and it's needs. Rather than considering themselves to be "out of control" they were encouraged to discover their inner selves and hidden needs by looking at their desire to overeat as an expression of the self.

Thus, the current program attempts to integrate a psychological approach to understanding overeating and women's relationship to food with a wellness program designed to overcome the serious health problems associated with obesity. It goes beyond traditional approaches to weight loss based upon these factors. It represents a belief that no symptom occurs in a vacuum but rather is a consequence of physical, emotional, interpersonal and cultural systems. While there are no clear cut answers to this complex problem it appears that we may be on the road to discovering a new type of treatment approach that encompasses the intricacy of women's relationship to food.

There are some pretty serious limitations to the present program and study. First and foremost would be the lack of broad spectrum changes that may have resulted with a more powerful treatment method such as individual psychotherapy in order to impact on self-esteem and a longer exercise training program to improve cardiorespiratory functioning. As mentioned earlier it would be impossible to assess whether the support group's emphasis on the psychological origins of hunger could be differientiated from the generalized and nonspecific effects of social support. It would be even more difficult to assess whether the skills the group members learned were internalized to the degree that the social support group would no longer be needed. While a follow up study is currently being planned, no statement can be made as to whether this type of program is more effective than traditional weight loss programs and their notoriously poor follow up results. It may be that people need to be in treatment for years in order for the treatment effects to remain stable.

Despite these limitations the current program does have some major strengths. One major strength would be the emphasis on developing both psychological and physical fitness. Many weight loss programs are designed on the deprivation model: less is better. This program is based on the idea that weight loss should be slow so

that the body and the mind can adjust to the changes associated with weight loss. Furthermore, the program places an emphasis on the individual's internal world as it influences their emotional, interpersonal and physical being. Rather than simply placing an emphasis on losing weight, there is an emphasis on taking care of the self both emotionally and through improving health status. Thus what sets this program apart from other more traditional weight loss programs is its comprehensiveness. It takes into account the individual as a complex system incorporating the emotional, the interpersonal, the physical and the self.

# REFERENCES

Abrams, D. B. & Follick, M. J. (1983). Behavioral weight loss intervention at the worksite: Feasibility and maintenance. Journal of Consulting and Clinical Psychology, 51, 226-233.

Albinson, J. G. (1974). Lifestyle of physically active and inactive college males. International Journal of Sports Psychology, 5, 93-101.

Altekrause, E. B. & Wilmore, J. H. (1973). Changes in blood chemistries following a controlled exercise program. Journal of Medicine, 15, 110-113.

Apfelbaum, M. (1978). Adaptation to change in caloric intake. Progress in Food and Nutritional Science, 2, 543-559.

Apfelbaum, M., Bostarron, J., & Lacatis, D. Effect of caloric restriction and excessive caloric intake on energy expenditure. (1971). American Journal of Clinical Nutrition, 24, 1405 -1409.

Bender, A. E., & Bender, D.A. (1976). Maintenance of weight loss in obese subjects. British Journal of Preventative and Social Medicine, 30, 60.

Bjorntorp, P. (1978). Physical training in the treatment of obesity. International Journal of Obesity, 2, 149-156.

Bjorntorp, P. (1980). Results of conservative therapy of obesity; Correlation with adipose tissue morphology. American Journal of Clinical Nutrition, 33, 370-375.

Borhani, N. O. (1977). Epidemiology of coronary heart disease. In Amsterdam E.A., Wilmore, J. H. & deMaria, A. N. (Eds.). Exercise and cardiovascular health and disease. New York: Yorke Medical Books, 1-12.

Boyle, P. C., Storlien, H., & Keesey, R. E. (1978). Increased efficiency of food utilization following weight loss. Physiology and Behavior, 21, 261-264.

Bray, G. A. (1969). Effect of caloric restriction on energy expenditure in obese patients. Lancet, 2, 297-398.

Bray, G. A. (1970). Measurement of subcutaneous fat cells from obese patients. Annals of Internal Medicine, 73, 565-569.

Bray, G. A. (1976). The Obese Patient, Philadelphia, Pa.: Saunders.

Bray, G. A. & Atkinson, R. L. (1977). Factors affecting basal metabolic rate. Progress in Food and Nutritional Science, 2, 395-403.

Brownell, K. D. (1982). Obesity: Understanding and treating a serious, prevalent disorder and refractory disorder. Journal of Clinical and Consulting Psychology, 50, 820-840.

Brownell, K. D. (1984). Behavioral, psychological, and environmental predictors of obesity and success at weight reduction. International Journal of Obesity, 8, 543-550.

Brownell, K. D., Heckerman, C. L. & Westlake, R. J. (1979). The behavioral control of obesity. A descriptive analysis of a large-scale program. Journal of Clinical Psychology, 35, 864-869.

Brownell, K. D., Heckerman, C. L., Westlake, R. J., Hayes, R. J. & Monti, P. M. (1978). The effectiveness of couples training and partner cooperativeness in the behavioral treatment of obesity. Behavior Research and Therapy, 16, 323-333.

Brownell, K. D. & Stunkard. Physical activity in the development and control of obesity. In A. J. Stunkard (Ed.). Obesity, Philadelphia: W. B. Saunders, 300-324.

Bruch, H. (1962). Perceptual and conceptual changes in anorexia nervosa. Psychosomatic Medicine, 24, 187-194.

Bruch, H. (1973). Eating disorders: Obesity, anorexia and the person within. New York: Basic Books.

Bruch, H. (1977). Anorexia nervosa. In S. C. Feinstein & P. Giovacchini (Eds.), Adolescent Psychiatry, (Vol. 5, pp. 293-303.). New York: Jason Aronson.

Bruch, H. (1985). Four decades of Eating Disorders. In D. M. Gardner and P. E. Garfinkel (Eds.), Handbook for psychotherapy for anorexia nervosa and bulimia. New York: The Guilford Press.

Buskirk, E. R. (1974). Obesity: A brief overview with emphasis on exercise. Federation Proceedings, 33 (8), 1948-1951.

Campbell, D. T. & Stanely, J. C. (1968). Experimental and quasi-experimental designs for research in teaching. In N. L. Gage (Ed.). Handbook in research on teaching. American Educational Research Association. Chicago: Rand McNally. 171-246.

Carkhuff, R. (1971). The development of human resources. New York: Holt, Rinehart and Winston.

Castelli, W. P., Doyle, J. J., & Gordon, T. (1977). HDL cholesterol and other lipids in coronary heart disease: The cooperative lipoprotein phenotyping study. Circulation , 55, 767-772.

Chernin, K. (1985). The hungry self. New York: Times Books.

Clifford, E. (1971). Body satisfaction in adolscence. Perceptual and Motor Skills, 33, 119-125.

Collingwood, T. R. (1972). The effects of physical training upon behavior and self attitudes. Journal of Clinical Psychology, 28, 583-585.

Collingwood, T. R. & Willett, L. (1971) The effects of physical training upon self concept and body attitudes. Journal of Clinical Psychology, 27, 411-412.

Cooper, K. H., Pollock, M. & Martin, R. (1976). Physical Fitness factors vs selected coronary risk factors. JAMA, 236, 116-169.

Craddock, D. (1978). Obesity and its management. London: Churchill Livingston.

Crisp, A. H. (1977). Some psychobiological aspects of adolescent growth and their relevance for the fat/thin syndrome (anorexia nervosa). International Journal of Obesity, 1, 231.

Crisp, A. H., Palmer, R. L. & Kalucy, R. S. (1976). How common is anorexia nervosa? A prevalence study. British Journal of Psychiatry, 128, 549-554.

Dahlkoetter, J., Callahan, E. J., & Linton, J. (1979). Obesity and the unbalanced energy equation: Exercise vs. eating habit change. Journal of Consulting and Clinical Psychology, 47, 898-904.

deVries, H. A. (1968). Immediate and log-term effects of exercise on resting muscle action potential level. Journal of Sports Medicine and Physical Fitness, 8, 1-11.

Douty, H. I., Moore, J. B. & Hartford, D. (1974). Body characteristics in relation to life adjustment, body image and attitudes of college females. Perceptual and Motor Skills, 39, 499-521.

Drenick, E. J., & Dennin, H. F. (1973). Energy expenditure in fasting men. Journal of Laboratory and Clinical Medicine, 81, 421-430.

Eichenbaum, L., & Orbach, S. (1983). Understanding women: A femininist and psychoanalytic approach. New York: Basic Books.

Eichoff, J., Thorland, W. & Ansorage, C. (1983). Selected physiological and psychological effects of aerobic dancing amoung young adults women. Journal of Sports Medicine, 23, 273-280.

Epstein, L. H. & Wing, R. R. (1980). Aerobic exercsie and weight. Addictive Behaviors, 5, 371-388.

Fitts, W. H. (1965). Manual: Tennessee Self-Concept Scale. Nashville, Tenn.: Counselor Recordings and Tests.

Folkins, C. H., Lynch, S. & Gardner, M. M. (1972) Psychological fitness as a function of physical fitness. Archives of Physical Medicine and Rehabilitation, 53, 503-508.

Foreyt, J. P., Goodrick, G. K., & Gotto, A. H. (1981). Limitations of behavioral treatment of obesity: Review and analysis. Journal of Behavioral Medicine, 4, 159-174.

Fox, S. M., Naughton, J. P. & Haskell, W. L. (1971). Physical Activity and the prevention of coronary heart disease. Annals of Clinical Research, 3, 404-432.

Froelicher, V. F. & Oberman, A. (1972). Analysis of epidemological studies of physical inactivity as a risk factor for coronary artery disease. Progress in Cardiovascular Disease, 15, 209-227.

Garrow, J. S. (1974). Energy balance and obesity in man. New York: Elsevier.

Garrow, J. S. (1978). The regulation of energy expenditure in man. In G. A. Bray (Ed.), Recent advances in obesity research (Vol. 2). London: Newman.

Gergin, K. J. (1971). The concept of the self. New York: Holt.

Gergin, K. J. (1977). The social construction of self-knowledge. In T. Mischel (Ed.). The self: Psychological and philosophical issues. Totowa, N.J.: Rowman and Littlefoeld, 139-169.

Gierszewski, S. A. (1983). The relationship of weight loss, locus of control, and social support. Nursing Research, 32, 43-47.

Goldwater, B. C. & Collis, M. L. (1985). Psychologic effects of cardiovascular conditioning: A controlled experiment. Psychosomatic Medicine, 47, 174-181.

Goodsitt, A. (1977). Narcissistic disturbances in anorexia nervosa. In F. E. Feinstein & P. Giovacchini (Eds.), Adolescent psychiatry (Vol.5, pp. 304-312). New York: Jason Aronson.

Goodsitt, A. (1985). Self psychology and the treatment of anorexia nervosa. In D. M. Gardner and P. E. Garfinkel (Eds.), Handbook for psychotherapy for anorexia nervosa and bulimia. New York: The Guilford Press.

Guyton, A. C. (1979). Physiology of the human body. Philadelphia: Saunders.

Gwinup, G. (1975). Effects of exercise alone on the weight of obese women. Archives of Internal Medicine, 135, 676-680.

Hanson, J. S. & Nedde, W.H. (1974). Long-term physical training effects in sedentary females. Journal of Applied Physiology, 37, 112-116.

Hartung, G. H. & Squires, W. G. (1980). Exercise and HDL cholesterol in middle aged men. Physical Sports Medicine, January, 44-49.

Haskell, W. L. (1984). Cardiovascular benefits and risks of exercise. In Strauss, R. (ed.). Sports Medicine. Philadelphia: W. B. Saunders.

Haskell, W. L. & Superko, R. (1984), Designing an exercise plan for optimum health. Family and Community Health, Vol.1, 7, 72-88.

Heaps, R. A. (1978). Relating psychological and physical fitness: A psychological point of view. Journal of Sports Medicine and Physical Fitness, 18, 399-408.

Hicks, R. W., Morton, M. L., & Brammall, H. L. (1979). The effect of physical training on blood lipid profiles in apparently healthy males. Presented at the American Association of Fitness Directors in Business and Industry Conference, Colorado Springs.

Hilyer, J. & Mitchell, W. (1979). Effects of systematic physical fitness training combined with counseling on the self concept of college students. Journal of Counseling Psychology, 26, 427-436.

Hilyer, J., Wilson, D. G., & Dillon, C. (1982). Physical fitness training and counseling as treatment for youthful offenders. Journal of Counseling Psychology, 26, 427-436.

Hudson, R. (1974). The Index of Self-Esteem.

Hughes, J. R. (1984). Psychological effects of habitual aerobic exercise. Preventative Medicine, 13, 66-78.

Jasnoski, M. L., Holmes, D. S., Solomon, S., & Arguir, C. (1981). Exercise, changes in aerobic capacity, and changes in self-perceptions: An Experimental Investigation. Journal of Personality Research, 15, 460-466.

Jones, D. M. (1985). Bulimia: A false self identity. Clinical Social Work Journal, 13, 305-316.

Jourard, A. M. & Secord, P. F. (1955). Body size and body cathexis. Journal of Consulting Psychology, 18, 184.

Jeffery, R. W., Wing, R. R., & Stunkard, A. J. (1978). Behavioral treatment of obesity: The state of the art in 1976. Behavior Therapy, 6, 189-199.

Kannel, W. B. & Gordon, T., (Eds). (1979). The Framington Study (p.140) U. S. Department of Health, Education and Welfare.

Katch, F. I. & McArdle, W. D. (1977). Nutrition, weight control and exercise. Boston: Houghton Mifflink.

Krotkiewski, M., Sjostrom, L., & Sullivan, L. (1977). Effects of long-term training on adipose tissue cellularity and body composition in hypertrophic and hyperplastic obesity. International Journal of Obesity, 2, 395.

Layman, E. M. (1974). Psychological effects of physical activity. Exercise and Sport Science Reviews, 2, 33-70.

Lebow, M. D. (1981). Weight control: The behavioral strategies. New York: Wiley.

Leon, A. S., Conrad, J., Hunninglake, D. B., & Serfass, R. (1979). Effects of a vigorous walking program on body composition and carbohydrate and lipid metabolism of obese young men. American Journal of Clinical Nutrition, 33, 1776-1787.

Lerner, R. M. (1969). The development of stereotyped expectancies of body build-behavior relations. Child Development, 40, 137-141.

Lerner, R. M. (1973). The development of personal space schemata toward body build. The Journal of Psychology, 84, 229-235.

Lerner, R. M. & Gelbert, E. (1969). Body build preference, identification, and aversion in children, Developmental Psychology, 5, 256-462.

Lerner, R. M. & Korn, S. J. (1972). The development of body build stereotypes in males. Child Development, 43, 908-920.

Lynch, M. D., Norem-Hebeisen, A. A. & Gergen, K. J. (1981). Self-Concept. Cambridge, Massachusetts: Ballinger Publishing Company

Mahoney, M. J. & Mahoney, K. (1976). A clinical exploration. In Obesity: Behavioral approaches to dietary management. In Williams, B. J., Martin, S. & Foreyt. New York: Brunner/Mazel.

Martin, J. E. & Dubbert, P. M. (1982). Exercise and health: The adherence problem. Behavioral Medicine Update, 14, 16-24.

Martinek, T. J., Cheffers, J. T., & Zaichawsky, L. D. (1978). Physical activity, motor development and self concept. Perceptual and Motor Skills, 46, 147-154.

Mayer, J. (1968). Overweight: Causes, costs and control. Englewood Cliffs, New Jersey: Prentice-Hall.

Mayer, J. & Bullen, B.A. (9174). Nutrition, weight control, and exercise. In W. R. Johnson & E. R. Buskirk (Eds.) Science and medicine of exercise and sport. New York: Harper & Row.

McGowan, R. W., Jarman, B. O., & Pederson, D. M. (1974). Effects of a competitive endurance training program on self concept and peer approval. Journal of Psychology, 86, 57-60.

McPherson, B. D., Paivio, A., Yuhasz, P. A., Rechnitzer, Pickard, H. A. & Lefcoe, N. B. (1967). Psychological effects of an exercise program for

postinfarct and normal adult men. Journal of Sports Medicine and Physical Fitness, 7, 95-102.

Miller, G. J. & Miller, N. E. (1975). Plasma high density lipoproteins and concentration and development of ischemic heart diease. Lancet, 1, 16-19.

Miller, D., Mumford, P. & Stock, M. (1967). Gluttony: Thermogenesis in overeating man. American Journal of Clinical Nutrition, 20, 1223-1229.

Miller, P. M. & Sims, K. L. (1981). Evaluation and component analysis of a comprehensive weight loss program. International Journal of Obesity, 5, 57-66.

Morgan, W. P. (1976). Psychological consequences of vigorous physical activity and sport. In M. G. Scott (Ed.) The Academy Papers. Iowa City: American Academy of Physical Education.

Morgan, W. P. (1981). Psychological benefits of physical activity. In F. J. Nagle and H. J. Montage (Eds.). Exercise in Health and Disease. Springfield, Illinois: Charles C. Thomas.

Nelson, R. A. (1978). Exercise in the treatment of obesity. In G. A. Bray (Ed.), Recent Advance in Obesity Research (Vol. 2). London: Newman.

Orbach, S. (1985). Accepting the symptom: A Feminist psychoanalytic treatment of anorexia nervosa. In D. M. Gardner and P. E. Garfinkel (Eds.), Handbook for psychotherapy for anorexia nervosa and bulimia. New York: The Guilford Press.

Paffenberger, R. S., Hale, W., Brand, R. & Hyde, R, J. (1977). Work energy level, personal characteristics and fatal heart attack: A birth-cohort effect. American Journal of Epidemiology, 105, 203-213.

Paffenberger, R. S., Wing, A. L., & Hyde, R. J. (1978). Physical Ativity as an index of heart attack risk in college alumni. American Journal of Epidemiology, 108, 161-175.

Palgi, A., Reid, J. R., Greenberg, I., Hoefer, M. A., Bistrian, B. & Blackburn, J. L. (1985). Multidisciplinary treatment of obesity with a protein-sparing modified fast: Results in 668 outpatients. American Journal of Public Health, 75, 1190-1193.

Parizkova, J. (1973). Body composition and exercise during growth and development. In G. L. Rarick (Ed.), Physical activity: Human growth and development. New York: Academic Press.

Parizkova, J. (1977). Body fat and physical fitness. The Hague, The Netherlands: Martinus Nijhoff.

Pauly, J. T., Palmer, J. A., Wright, C. C. & Pfeiffer, G. J. (1982). The effect of a 14-week fitness program on selected physiological and psychological parameters. Journal of Occupational Medicine, 24, 457-463.

Perri, S. & Templer, D. I. (1985). The effects of an aerobic exercise program on psychological variables in older adults. International Journal of Aging and Human Development, 20, 167-172.

Rogers. C. (1951). Client-centered therapy. Boston: Houghton Mifflin.

Rogers, T., Mahoney, M. J., Mahoney, B. K., & Kenigsberg, M. I. (1980). Clinical assessment of obesity: An empirical evaluation of diverse techniques. Behavioral Assessment, 2, 161-181.

Roman, O., Camuzzi, A. L. & Villalon, E. (1981). Physical training program in arterial hypertension: A long-term prospective follow-up. Cardiology, 67, 230-243.

Roth, G. (1982). Feeding the hungry heart. Signet Books: New York.

Schener, J. & Tipton, C. M. (1977). Cardiovascular adaptations to physical training. Annual Review of Physiology, 39, 221-251.

Shavelson, R. J., Hubner, J. J., & Stanton, G. C. (1976). Self-concept: Validation of construct interpretation. Reviews of Educational Research, 46, 407-441.

Short, M. A., DiCarlo, S., Stefee, W. P. & Pavlov, K. (1984). Effects of physical conditioning on the self-concept of adult obese males. Physical Therapy, 64, 194-198.

Sonstroem, R. J. (1984). Exercise and self-esteem. Exercise and Sport Science Reviews, 2, 33-70.

Staffieri, J. R. (1967). A study of social stereotype iof body image in children. Journal of Personality and Social Psychology, 7, 101-104.

Staffieri, J. R. (1972). Body build and behavior expectancies in young females. Developmental Psychology, 6, 125-127.

Stalonas, P. M., Johnson, W. G., & Christ, M. (1978). Behavior modification for obesity: The evaluation of exercise, contigency management and program adherence. Journal of Consulting and Clinical Psychology, 46, 469-476.

Stunkard, A. J. (1958). The management of obesity. New York Journal of Medicine, 58, 79-87.

Stunkard, A. J. (1980). Obesity. Philadelphia: Saunders.

Stunkard, A. J. & Brownell, K. D. (1980). Worksite treatment for obesity. American Journal of Psychiatry, 137, 252-253.

Thompson, J. K., Jarvie, G. J., Lahey, B. B., & Cureton, K. J. (1982). Exercise and obesity: Etiology, physiology, and intervention. Psychological Bulletin, 91, 55-79.

Van Itallie, T. (1977). Testimony before the Senate Select Committee on Nutrition and Human Needs. Washington, D. C.: U. S. Government Printing Office.

Van Itallie, T. (1978). Dietary approaches to the treatment of obesity. Psychiatric Clinics of North America, 1, 606-619.

Wallace, J. P. (1975). Responses of the composition of body fat to cardiovascular training in college women. Research Quarterly, 46, 317-322.

White, A. J. (1973). The interrelationships between measures of physical fitness and measures of self-concept of selected Mississippi State University male students. Unpublished doctoral dissertation, Mississippi State University.

Wilmore, J. H. (1973). Physical exercise and body composition. In J. Vague & J. Bayer (Eds.). The regulation of the adipose tissue mass. New York: American Elseveir.

Wilson, G. T. (1978). Methodological considerations in treatment outcome research on obesity. Journal of Consulting and Clinical Psychology, 46, 687-702.

Wilson, G. T., & Brownell, K. D. (1980). Behavior therapy for obesity: An evaluation of treatment outcome. Advances in Behavior Research and Therapy, 3, 49-86.

Wing, R. R. & Jeffery, R. W. (1979). Outpatient treatments of obesity: A comparison of methodolgy and clinical results. International Journal of Obesity, 3, 261-279.

Wooley, S. C., Wooley, O. W., & Dyrenforth, S. R. (1979). Theoretical, practical and social issues in behavioral treatments of obesity. Journal of Applied Behavior Analysis, 12 3-26.

Wylie, R. C. (1974). The self-concept: A review of methodological considerations and measuring instruments. (Vol. 1, Rev. Ed). Lincoln: University of Nebraska Press.

Yang, M. U., Barbosa-Salivar, J. L., PiSunyer, F. X., & Van Itallie, T. B. (1981). Metabolic effects of substituting carbohydrate for a protein in a low-calorie diet: A prolonged study in obese outpatients. International Journal of Obesity, 5, 231-236.

# VITA

Betsy Claire Rubin was born in Long Beach, New York on December 4, 1957. She attended elementary schools in that city. She moved to Jacksonville, Florida in September of 1972 and graduated from Wolfson High School in June of 1974 when she was sixteen years old. She attended Florida Junior College and The University of North Florida in Jacksonville. She graduated from the University of North Florida in 1980 magna cum laude, with a Bachelor of Arts degree in Psychology. She received the Outstanding Senior Award for academic performance and community service.

After two years of clinical and industrial testing experience, she was accepted to the graduate program in clinical psychology at the University of Tennessee in 1983. During this time she obtained four years of experience in psychotherapy and psychological assessment. In addition, she developed and directed the Weight Loss and Wellness Programs at Ridgeview Psychiatric Hospital in Oak Ridge, Tennessee. She received her Doctor of Philosophy degree in August of 1988 after completing her clinical internship at the University of Colorado Health Sciences Center.