MAINTENANCE OF WEIGHT LOSS: PERSONALITY FACTORS AND DEMOGRAPHIC CHARACTERISTICS

BY

TONI ENGLAND

Bachelor of Science
University of Tulsa
Tulsa, Oklahoma
1967

Master of Science
Oklahoma State University
Stillwater, Oklahoma
1986

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
July, 1991

MAINTENANCE OF WEIGHT LOSS:

PERSONALITY FACTORS AND

DEMOGRAPHIC CHARACTERISTICS

Dissertation Approved:

Thesis Advisor

Dean of the Graduate College

ACKNOWLEDGEMENTS

I wish to express sincere appreciation to Dr. Brent Snow for his encouragement and advice throughout my graduate program. Many thanks also go to Dr. Jo Campbell, Dr. Al Carlozzi, and Dr. Ken Sandvold for serving on my graduate committee. They have provided intelligent guidance, inspiration, and invaluable assistance throughout the course of this work. I wish to express my sincere gratitude to Maureen McCarthy for the patience, friendship and keen intelligence she freely shared during this project.

To the physicians and clinics and subjects who participated in this study I extend sincere thanks. Without their involvement the study would not have been possible. To Ann Thompson for her expert typing and proofing skills and her sense of humor. She made the ending go smoother.

To my children Eric, Brent, and Scott and my husband Monte, who encouraged and supported me all the way and helped me keep the end goal constantly in sight. Special gratitude to Monte who provided moral support and was a real believer in my abilities. To Debra Gesin who gave me many rewarding times and was so patient with me, I extend many hugs. I extend a sincere "thank you" to all of these people. They all have contributed to this work.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

For millions of overweight Americans, the problems of losing weight and maintaining a weight loss have become a virtual obsession (Brownell, 1984; Gurin, 1989; Stunkard, 1980). The frustrations experienced by the overweight and obese are compounded by the high recidivism rate associated with weight loss (Brownell, 1984). About 95% of the individuals who lose weight tend to regain it within the first year (Wing & Jeffery, 1979). Although obesity and weight loss are addressed extensively in the medical and psychological literature, maintenance of weight loss has received little attention in research efforts or in the literature (Brownell, 1984; Gurin, 1989; Wing & Jeffery, 1979).

The prevalence of obesity, according to national surveys and clinical studies, may vary depending on such factors as age, sex, socioeconomic status, race, education, and other relevant criteria used to define overweight and obesity (Bray, 1982). Overweight is generally defined as ten percent above ideal body weight. Obesity is defined as 20% or more above ideal body weight (Krause & Mahan, 1979). Ideal body weight is based on the percentage of body fat to

muscle and bone mass. For men: 15-22% of total body weight; for women: 20-27% of total body weight. (Metropolitan Insurance Charts, 1985).

Obesity has long been identified as a contributing factor to poor health. Limited progress has been made in its treatment. Three factors combine to make obesity a serious health problem. First, it has serious medical and psychological consequences (Bray, 1976; Brownell, 1984; Garrow, 1981; Rodin, 1979; Stunkard, 1980; Van Itallie, 1979). The obese person is at increased risk for hypertension, hyperlipidemia, diabetes, and, via these risk factors, coronary heart disease (Bray, 1976; Garrow, 1981; Van Itallie, 1979). The psychological and social disadvantages of being overweight can be even more disabling than the medical complications (Brownell, 1982; Rodin, 1979; Stunkard, 1976). Second, obesity is a prevalent disorder in the United States. The estimates of the prevalence of obesity range from 15% to 50% (Bray, 1976; Van Itallie, 1979). Approximately 25% of all children are obese (Bray, 1976). Third, obesity has thus far been resistant to a variety of treatments (Bray, 1976; Brownell, 1984; Garrow, 1981; Rodin, 1979; Stunkard, 1980; Van Itallie, 1979). According to Brownell (1984), one of the most prolific researchers of obesity, if "cure" from obesity is defined as reduction to ideal weight and maintenance of that weight for five years, a person is more likely to recover from many forms of cancer than obesity.

Obesity frustrates the sufferer and the professional who seeks to remedy the problem. The typical patient loses weight but then begins the seemingly immutable process of relapse or rebounding (Brownell, 1984).

One problem in the field has been that information about obesity is scattered among the literatures of many disciplines, including nutrition, physiology, psychology, epidemiology, medicine, and pediatrics. This typifies the diverse origins and the complexity of its consequences in research. Some professionals have suggested a broad interdisciplinary view which may offer hope for gaining clarifications of this important problem (Brownell, 1984). This study suggested an even closer look at the psychological implications for the overweight and obese.

Research indicates that there is no difference between the effectiveness (whether an individual can lose weight) of various recognized diet programs and that most are effective depending on the individual's compliance with the diet's regimen (Brownell, 1984; Gurin, 1989; Stunkard, 1980). However, this same research also indicates the need for physician-supervised programs for safer weight loss and maintenance due to long-term health considerations.

Unfortunately, few effective weight-management programs have been reported. Some exceptions are the behavioral approaches, surgical interventions, and the newest weight program--very low-calorie liquid intake diets (Brownell, 1984; Leon, 1976; Jeffery, Gerber, Rosenthal, &

Linquist, 1983). Furthermore, investigations reporting significant weight reduction during treatment have also indicated that most individuals subsequently regained the lost weight (Foreyt, et al., 1982; Gurin, 1989; Leon, 1976) and have shown high percentages of drop-outs (Abrams & Follick, 1983; Jeffery, Vendor, & Wing, 1978).

The failure of research on weight-management to find a generally effective intervention may reflect a lack of consideration of subject variables (Bruch, 1973; Kincey, 1980). Weight change appears to result from not just a particular treatment or diet but rather the interaction of the treatment, diet and the unique physiology and personality of the subject. Further, the factors which contribute to the initial reduction are likely different from those affecting maintenance of this loss (Abrams & Follick, 1983; Bolocofsky, Coulthard-Morris, & Spinler, 1984; Kingsley & Wilson, 1977). This study focused on identifying these unique psychological characteristics of successful weight maintainers.

As mentioned before, only brief attention has been given to the aftermath of weight loss for an identified period of sustained maintenance of a specific number of pounds lost. One obvious problem with research efforts has been the limited numbers of weight maintainers and poor research methods to identify the unique physiological and psychological differences of this small population. Most research efforts focus on the complexities of the

biological basis for overweight and obesity; however, little notice is given to the personality features of a patient. In addition, most research that has addressed this area has been interested in differentiating personality characteristics of the obese from those who are not. This research has identified no real differences (Brownell, 1984; Gurin, 1989). Another problem in these various attempts is that not enough attention was given to the time frame of the sustained weight loss. Most investigated weight loss immediately following a treatment program. Some research efforts have made a connection between maintaining weight loss for at least one year resulting in metabolic changes and set point (Brownell, 1984; Stunkard, 1980).

Research that has addressed weight loss maintenance examined differences between maintainers and regainers utilizing retrospective reports (Stuart & Guire, 1978; Leon & Chamberlain, 1973). Limited research has identified some distinctions between weight loss characteristics and weight maintenance characteristics which were specific to the treatment employed, suggesting the possibility of differences existing between those who maintained lost weight and those who regained lost weight (Bolocofsky, et al., 1984). The present study utilized a retrospective approach to determine from identified maintainers and regainers not only the dynamics or variables of successful maintenance, but also culling from the responses on a personality

inventory a characteristic profile depicting some distinctions between the two groups. Furthermore, maintenance of weight loss over time has been studied by few researchers and they have restricted the follow-up period to one year or less (Brownell, 1984; Stunkard, 1980). This study was a retrospective analysis including longer periods of weight maintenance over one year.

During the last thirty years, research has evolved from a purely psychological etiology of overweight and obesity down to physiological causes (Gurin, 1989). These investigations have strongly established that the overweight and obese are not that much different in terms of demographic variables like socio-status, sex, and age than the non-obese individuals. Eating patterns are also similar (Brownell, 1984; Gurin, 1989). It appears from the latest studies by the medical establishment and bariatric researchers that the old viewpoint about weight control is out of date (Gurin, 1989). This theory espoused that if people got fat they simply ate too much and ingested too many calories. This could have been stimulated by depression, excitement, anxiety, distraction, or boredom. If new eating habits could be learned (taking smaller portions, eating slowly, etc.) people would lose weight (Gurin, 1989). Now this concept is questioned and replaced with the rationale that an individual's weight has more to do with biology than with psychology (Brownell, 1984; Gurin, 1989). According to these concepts, a weight problem may

have more to do with a physiological tendency to be fatter and not from a deep neurotic need to stuff oneself.

Emphasis is now on dietary fat control instead of calorie control or any focus on deep psychological motivations (Gurin, 1989). Gurin (1989) and Brownell (1984) suggest that with decreased fat consumption and moderate exercise, a person will become leaner, sleeker, more toned, and ultimately healthier. This does not mean an individual will necessarily be lighter, because the muscle adds more weight than the fat lost. Experts claim inches will be lost, appearance, self-esteem and health will be improved (Brownell, 1984; Gurin, 1989). These factors don't have to correlate with a reading on a scale according to this new theory.

This revisionistic thinking also implies that an individual body weight may be determined by genetic factors like metabolic rate, number and size of fat cells, and set point. Despite these factors, however, the theorists posit that weight control continues to be an issue of mind over body. They claim that setting realistic goals and modifying views about food and exercise will enable an individual to reach a weight that is more comfortable and therefore more realistic (Brownell, 1984; Gurin, 1989).

Significance of the Study

If genes do in fact direct and control the body's response to diet and exercise, then mental health

professionals may have to rethink the psychological ramifications of weight loss and maintenance. Extensive research can increase an understanding of those personality characteristics that identify those individuals who can overcome this powerful biological force to maintain a certain body weight. Not only is it important to focus on why and how a person is able to lose weight and maintain that loss, but it is equally important to determine what makes that individual different or unique as compared to others who are unable to lower their fat consumption or decrease body weight. This demands a closer inspection of the multiple variables. Early identification and implementation of any kind of weight loss or maintenance program without attention to psychological issues could contribute to program failure and patient frustration and relapse.

Currently there exists little information about a personality profile that can be combined with a treatment program to increase compliance with weight loss maintenance (Armillay, 1985). Because of increased knowledge about the physiological pressure to regain lost weight, there is even a stronger need to understand the psychological issues that are necessary to overcome the powerful biological rebounding effect (Brownell, 1984).

Identification of a profile may assist in some kind of screening to design a more individualized treatment method as well as to detect early those people who are at risk of regaining lost weight, or preventing relapse. Being able

to combine a psychological profile with other discriminators of potential successful weight maintainers could promote an internal feeling of control and satisfaction for a patient, increasing the chances of continued maintenance.

Research through the years has demonstrated a major focus on the issues of weight loss and obesity; however, little knowledge exists about the dynamics and characteristics of sustained weight maintenance. This study attempted to identify personality factors and demographic variables that may differentiate maintainers from regainers.

Statement of the Problem

The study considered the following problem: What are the personality factors that differentiate individuals who have maintained weight loss for one year from individuals who have regained lost pounds within a year after weight lost?

Research Questions

Questions that were relevant to this study included: Was there a group of personality factors that could differentiate maintainers from regainers? What were the characteristics of maintainers and regainers on demographics of age, sex, income level, marital status, and degree of exercise?

Implications

This study had several important implications. Further information is needed about the psychological dynamics associated with maintaining weight loss. The possible development of a psychological profile could assist professionals in the design of weight loss and maintenance programs. In addition, compliance in these weight loss and maintenance methods may be stronger if the method of treatment is more suited to the individual personality type.

Furthermore, overweight continues to be one of the greatest health problems in the United States today (Brownell, 1984). Estimates vary considerably according to data gathering but 20 to 25% of the adult population is considered overweight, which may be a conservative estimate (Brownell, 1984).

Weight has been implicated in an array of diseases. In addition, due to the prevailing social attitudes regarding obesity, discrimination in several areas including economic, vocational and school-related activities may have been felt by overweight or obese individuals.

It therefore seemed crucial that more knowledge be obtained about the problem of maintaining a weight loss toward the goal of more effective long-range treatment programs and stronger patient compliance.

Objectives

One objective of the study was to determine whether maintainers and regainers differ according to responses on the secondary personality factors as measured by the Cattell Sixteen Personality Factor Questionnaire (16PF, Institute for Personality and Ability Testing [IPAT], 1986). Another objective of this study was to describe the demographic variables of sex, age, income level, marital status, and degree of exercise of maintainers and regainers.

Definitions of Terms

For the purpose of the study, the following definitions were employed:

1. compliance: the patient's adherence to maintenance.
2. diet program, diet method, treatment: any recognized diet attempt including Weight Watchers, low calorie, liquid diet regime (Medi-fast, Opti-Fast, Ultra-fast, etc.), Nutri-System, or diet attempt where food, calories or fat was restricted when supervised by a physician.
3. goal weight: weight predetermined by a measure of the percentage of muscle to bone mass to be reached on a diet and validated by the physician or clinic staff as a realistic weight for the patient.

4. ideal body weight (IBW): the percentage of body fat to muscle and bone mass. For men: 15%-22% of total body weight; for women: 20%-27% of total body weight.
5. maintenance weight loss: maintenance of a weight within 15% of goal weight for a period of one year previous to this study.
6. maintainers: those individuals who have been on a weight loss program and maintained that weight within 15% of goal weight for one year after completion of a diet regime prior to this study and who have not participated in any other diet regime within that one year.
7. overweight: 10% over ideal body weight.
8. obesity: 20% or more over ideal body weight
9. realistic body weight: body weight that patient feels and identifies from previous experience that can actually be maintained.
10. regainers: those individuals who have not maintained weight loss for one year after completion of a diet regime and who have regained a portion or more than 15% of goal weight previous to this study.
11. degree of exercise: number of sessions of exercise undertaken during one week, and time duration of each session.

Limitations of the Study

This study was restricted to a predominantly urban metropolitan population in the Southwest which included individuals attending two weight loss clinics--a low-calorie, low-fat program and a liquid weight loss program. No subjects were included who were not involved with physician-assisted programs because of medical ethics advocating that patients on a diet be monitored by qualified medical personnel, as well as the difficulty involved in reaching this population.

Participation in the research was voluntary and the subjects were selected by physicians and clinic staff utilizing predetermined criteria of weight maintenance established by the researcher. This was a retrospective study looking at maintenance factors after supervised diet intervention.

Randomized assignment was restricted due to the retrospective nature of the study in looking at those who already had lost weight, maintained or regained. Random selection was also limited by the retrospective nature of the study. Obviously, there was an inability to control all the variables that might have caused interference in this study, including nutritional and physiological factors.

A critical limitation of this study was the inability to evaluate the population at large. Therefore,

generalizability was restricted to a similar population of white, middle-class adults who seek out a weight loss clinic or physician for a specific diet program.

Overview

Little information exists concerning the problem of weight maintenance. Additional knowledge is necessary to distinguish the differences between maintainers and re-gainers of lost weight in reference to personality and demographic variables. This study used Cattell's 16 PF to identify personality factors of maintainers and regainers. Demographic variables were described using a self-administered questionnaire.

Chapter Two includes a literature review of issues relevant to weight loss, obesity, and maintenance focusing on physiological and psychological origins. Chapter Three presents the methods and procedures of the study. Chapter Four presents the results of the statistical analyses and Chapter Five presents a review of the study, a discussion of the implications of the research, and the conclusions that can be derived from this study.

CHAPTER II

LITERATURE REVIEW

Obesity is one of the most serious medical problems of modern times. Few disorders can compare with obesity in its prevalence, serious medical and psychological concomitants, and almost unbelievable resistance to treatment (Brownell & Wadden, 1983). The seriousness and prevalence compel researchers and clinicians to constantly attempt cures and treatment modalities to suppress the continually growing number of obese individuals (Brownell, 1984). According to Brownell (1984), obesity is resistant to treatment: "If a cure from obesity is defined as reduction to ideal weight and maintenance of that weight for five years, a person is more likely to recover from many forms of cancer than from obesity" (Brownell, 1984, p. 406).

Medical complications and failure in treatment outcomes are not the only problems of the obese overweight individual. The psychological and social disadvantages of being overweight can be even more disabling than the medical complications (Brownell, 1984). The unfortunate social consequences of obesity are further exaggerated by the fact that our society's attitude toward the obese is

degrading (Brownell, 1984). The obese individual is blamed for his/her disorder and is held responsible for the consequences that result from a lifetime of diets. The overweight person internalizes at an early age the dim view of a career of degradation and unsuccessful attempts at weight loss (Brownell, 1984).

Obesity not only frustrates the obese individual but it also battles against the professional who seeks to remedy the problem. Over the past several decades there have been numerous publications which indicate that obesity is not simply a disorder of overeating. The first segment of this literature review will explore the physiological complexities of obesity and investigate the currently accepted causes of obesity. Later sections review studies related to the psychological and demographic characteristics of weight loss.

Studies Related to Physiology of Obesity

The cause of obesity has long been diagnosed merely as hyperphagia (overeating) (Brownell, 1984; Stunkard, 1980). Overeating does indeed manifest itself to be the most critical immediate cause of obesity and overweight. In order to consider this phenomenon, it is useful to explain the physiology of nutrition.

In the study of nutrition, it is acceptable to believe that nutritional integrity implies that normal intake, digestion, absorption, metabolism, and elimination of food

should proceed without interruption or abnormality (Groer, 1979). The body systems must be functioning well for this to occur. The brain and nervous system are required for regulation of food intake in proper amounts. The gastrointestinal tract's ability for digestion and absorption are needed. The circulatory system must transport nutrients from the gastrointestinal tract to the body. The liver and adipose tissue are the major metabolic organs regulating body nutrition and storage of excess calories. Hence, they provide homeostasis for food intake, metabolism and waste disposal. Thus, the maintenance of nutrition is a function of all systems and involves complex mechanisms resulting from the interaction of a great variety of influences (Groer, 1979).

The process described above is defined as metabolism, i.e., the process by which ingested food molecules are utilized either for work by the organism or in the synthesis of new organic compounds. The task of metabolism is to release in a usable form the energy contained in the carbon-hydrogen bonds of food molecules. The way that the released energy is coupled to function in the cell is determined by the genetic and environmental factors of the particular cell, tissue or organ (Groer, 1979).

The idea that a difference in metabolic efficiency might be the cause of some types of obesity has been the subject of much investigation (Stunkard, 1980). Several mechanisms have been proposed by which metabolic efficiency

might be achieved. According to Bray (1982), they are: (a) differences in specific dynamic action of food (thermal effect) or increased metabolism in the tissue--like brown fat; (b) obese subjects might have a lower protein turnover, thus requiring less energy for synthesis of protein and making more available for storage (reduced breakdown and resynthesis of triglyceride is another mechanism for conservation of energy); and (c) the obese individual may be more efficient in muscular movement, thus expending less energy for the same amount of work.

Thus, metabolism has long been the focus of obesity (Bray, 1982; Stunkard, 1980). Metabolism along with other other causes of obesity have traditionally been investigated prior to diagnosing the subject as obese or diagnosing obesity. The following pages consider such "traditional" causes of obesity.

Traditional Causes

Obesity may develop in patients with hypothalmic tumors as a sequela to brain trauma or with inflammatory diseases. The hypothalamus has long been named as the appetite control center of the body. Recent studies by Teitelbaum (Stunkard, 1980) confirm that lesions of the lateral hypothalamus produce deficits in feeding and weight regulation. In addition, obesity may develop in patients with a variety of endocrine diseases and other hormonal changes, including cushing syndrome, hypothyroidism,

thyroid deficiency, castration, Stein-Leventhal, and pregnancy (Schneider, 1977).

The study of familial resemblance has provided strong support for the old presumption that obesity runs in families. However, this has been questioned with the environmental influence. Studies have established a significant correlation between skinfold thickness of parents and their children who share common genes and environment (Stunkard, 1980). However, the correlation coefficient between skinfold thickness of marital partners, who share only their environment, is almost as high. This data, however, proposed that human obesity is primarily of environmental origin (Stunkard, 1980).

Studies of obesity involving sets of twins are few. However, analysis of fatfold thickness and percentage overweight of twins demonstrates a substantial role for heredity (Stunkard, 1980). The influence of heredity on adiposity appears to increase during late childhood. During adolescence and throughout adulthood, the heritability of adiposity appears to be high and fairly stable. While children share a home, a small proportion of familial resemblance is due to shared environment, but effects of the common environmental influences that contribute to the resemblance of twin children disappear almost entirely in adulthood (Stunkard, 1980).

In terms of adoption studies that provide the correlation between genetic and environmental obesity, the

studies are contradictory. That is, the three major adoption studies are in complete disagreement with each other (Stunkard, 1980).

Obesity may also be a factor in patients who have taken certain drugs, such as phenothiazines or oral hypoglycemic agents and tricyclic antidepressants (Bistrian, 1980). Antidepressants often cause a craving for carbohydrates. In many psychologically disturbed patients, it has been found that the medication necessary to keep them calm caused excessive carbohydrate cravings and subsequent weight gain (Stunkard, 1980). Excessive intake of liquids with certain medications can cause fluid weight gain.

Patients with hyperinsulinemia may be at risk for obesity. The finding of increased insulin concentration in the blood in all forms of human obesity is what some authorities feel to be the primary defect that causes obesity (Groer, 1979). However, others consider this response to be psychologic in nature. A number of obese people have a metabolic response to sight, smell, and sound of food cooking (coffee perking, steak sizzling). These psychological effects can appear consistently in the overweight subject (Simonson, 1982). Psychologically, these effects cause the pancreas to increase the insulin flow into the subject's blood stream. Insulin surges not only create marked hunger sensations but actually speed conversion of formerly ingested food to stored fat.

Insulin has a propensity to influence body organs to manufacture fat out of glucose by-products which are obtained from food. Bistrian (1980) describes this interrelationship as a paradox of obesity:

> The adipose tissue mass in the normal individual may be only one-third as large as that of an obese individual. Since insulin regulates the rate of release of free fatty acids (FFA) from adipose tissue, if the normal and obese individual had the same insulin levels, FFA levels would be three times as high in the obese individual as in the person of normal weight. However, as the level of FFA rises, they displace glucose as fuel. The rise in glucose causes insulin secretion, which dampens the rate of release of FFA from adipose tissue. This creates the paradox of obesity, whereby individuals have higher FFA levels and higher insulin levels than normal individuals. The resultant tendency to hyperinsulinemia in obesity encourages lipogenesis (Bistrian, 1980, p. 112).

The presence of hyperinsulinemia and insulin resistance in the obese individual clarifies the predisposition of the obese toward the eventual development of diabetes mellitus and thus provides excellent rationale for weight control (Groer, 1979).

Obesity has been associated with the mechanism known as thermogenesis, which is simply defined as heat

production of the body which is not linked with working activities or basal metabolism. According to the thermostatic hypothesis, the body's heat production and temperature changes influence food intake (Simonson, 1982). It is commonplace to find individuals who can eat enormous amounts of food without weight gain, as well as the converse (Stunkard, 1980). In periods of undernutrition, thermogenesis may be decreased so that energy from available calories is directed toward maintenance of nutritional and metabolic status.

Enzymes and their relation to weight gain have shed light on another theory of obesity. Harvard researchers directed by Mario DeLuise have conducted a study involving an enzyme called ATPase which in below-normal levels in the human body may actually predispose certain people to gain weight (Simonson, 1982).

This enzyme exists in all cells in the body and helps to burn off 15 to 40 percent of all calories not used during physical activity. However, the obese person has 20 to 25% less ATPase than a person of normal weight. The more obese the person, the lower the level of ATPase in the red blood cells. The energy used by the red blood cells of severely obese subjects was shown to be 22% less than those of normal weight (Simonson, 1982). Therefore, some obese people may burn up fewer calories than a thinner person.

Obesity has been linked to reduced activity. The society in which we live, work and play has made life very

sedentary. The food intake has remained constant; however, the activity level has decreased tremendously (Stunkard, 1980).

Psychosocial factors of obesity may be associated with habit, culture and "food cues." These stimuli have evolved since birth. The process is gradual and unassuming until the excess weight is noticeable. People are surrounded by food and unfortunately some individuals cannot control the urge to indulge (Stunkard, 1980).

Hyperphagia, an excessive dietary intake of food, has long been the predominating factor in obesity. Within this cause are the factors that involve the psychological aspects of overeating (Stunkard, 1980). Some individuals may be influenced by non-nutritional needs for food, e.g., feelings of boredom, loneliness, insecurity, inadequacy, fear and hostility, unsatisfied sexual urges, and frustrations in job achievements (Brownell, 1984). Included in this group are compulsive eaters, bulimics, and excessive drinkers (non-alcoholic). An interesting phenomenon is the "pregnant father syndrome," lipophobic obesity, in which the husband presents symptoms similar to pregnancy in sympathy with his wife. There are those who eat excessively for underlying reasons and those who eat excessively purely for enjoyment. Enjoyment as a cause can be referred to as true hyperphagia (Brownell, 1984).

The aging process is related to obesity. At about age 40 there is a reduction of lean body mass and a change in

body composition. An atrophy exists due to decreased cell division and decreased cell function. The metabolism of the adult (40-plus years) is gradually reduced. The thyroid gland functions normally but there is less need for the hormone. Therefore, the rate of production and destruction of the thyroid is reduced. This reduction of cerebular blood flow is related to the metabolism of aging (Kalchthaler, 1983). The gradual decrease in metabolic rate, combined with the reduced need of thyroid function, implies a need for reduced calorie intake (Kalchthaler, 1983). The combination of a high calorie intake, decreased activity and a gradual decrease in metabolic process will normally lead to weight gain. The recommendation of reduced calorie intake is highly warranted for this population (Kalchthaler, 1983).

More Recent Understandings

The preceding section presented both traditional and theoretical causes of obesity. This section is a presentation of more recent understandings of the causes of obesity.

The "Set Point Theory" (Keesey, in Stunkard, 1980) states: "A remarkable feature of complex organisms is the stability of their internal environment in the face of widely varying external conditions" (Stunkard, 1980, p. 114). Organisms are able to achieve internal stability. The question arises concerning body weight: "Is body weight maintained and defended in a manner similar to other

regulated physiological variables?" (Stunkard, 1980, p. 116).

The hypothalamus or lower portion of the brain is believed to determine the set-point for weight in humans. The body is programmed or monitored to maintain this weight to such a degree that it actually counters any diet one might try (Keesey, 1980).

Researchers have programmed subjects to maintain weight at an elevated level and then through decreased intake the subjects would lose weight. After a while, some subjects simply cannot lose any weight although their intake is not increased (Keesey, 1980).

Possibly this non-loss can explain the plateauing effects for some dieters. When some individuals swear they have not deviated from their dietary program yet have not lost a pound, they may be telling the absolute truth (Brownell, 1984).

It is hypothesized that the adjustment of metabolism by the hypothalamus causes more fat to increase from the lower number of calories consumed (Keesey, 1980). The result is that weight loss stops. However, a basic explanation of this theory and a treatment plan of reduced calorie intake with increased energy output that can help break the set point, should reinforce the need for dietary management (Stunkard, 1980). The failure in weight loss may account for repeated attempts at diets with little success and the feeling of increased defeat by the patient.

A working knowledge of the management of the set point could be one method of increasing motivation (Brownell, 1984).

The stability of this maintenance supports the view that body weight, much like body temperature or total body water, is regulated around some reference level or set point. Keesey's (1980) observations suggest that the organism resists being displaced from their body weight set points by adjusting their rates of energy expenditure. When body weight falls below the value normally maintained there is a marked decrease in the rate of energy expenditure (Keesey, 1980). As a result, the number of calories needed just for weight maintenance is substantially reduced. Normal levels of dietary food intake are sufficient to promote weight gain (Keesey, 1980).

Hence, the theory of energy balance (energy intake = energy output) must be precluded with the set-point theory. It can be assumed, then, that another cause of obesity is related to a metabolic shift which will defend its set point (Keesey, 1980; Stunkard, 1980).

In the past decade another theory of obesity has been hypothesized, called the fat cell theory (Brownell, 1984). The basis for this theory is explained simply: given a set number of fat cells at birth, an individual can multiply the number of fat cells (hyperplasia) during rapid growth spurts. This increased number can then expand in size (hypertrophy) and the result is larger fat cells in a

greater quantity. Therefore, adult-onset obese individuals can have fat cells that are larger than their normal weight levels and childhood-onset obese individuals can have an increased number of fat cells (Brownell, 1984).

Hence, the juvenile onset obese person has the tremendous number of fat cells that can expand during his/her lifetime. This would explain the incidence of dieting with an unrealistic achievement of a successful weight loss. According to Bjorntorp (Greenwood, 1983) the failure rate and drop-out rate in treatment programs can best be summarized by stating that once the fat cells reach normal size and a weight plateau is arrived at, weight loss stops. Cell size may present a biological limit beyond which weight loss exceeds and fat cell number may determine body weight when this limit is reached. Researchers agree that this theory is appealing, however, more research needs to be conducted in this area (Brownell, 1984).

Another interesting link with the fat cell theory is that of fat cell morphology and the relation of a complex chain called lipoprotein lipase (LPL) (Greenwood, 1983). LPL is an enzyme that is synthesized by the fat cell and is needed for the uptake of fatty acid in adipose tissue. According to Greenwood (1983), adipose tissue LPL activity increases with weight loss, which indicates that cells are more efficient at accumulating energy.

Hence, resistance to treatment may not be resistance toward dietary compliance, but resistance may be an

accumulation of many physiological factors (Brownell, 1984). The clinician must be cognizant of the many causes of obesity and aware of the perils than an obese individual deals with on a daily basis. If one were to combine any number of the causes presented and attempt to rationally treat obesity, the task would be tremendous. A working knowledge of the science of obesity and the many hypotheses present today is imperative (Brownell, 1984). The attempt at treatment is very often precluded with our society's degrading attitude toward the obese. This attitude then transfers to the client and further complicates the treatment phase (Brownell, 1984).

The following section deals with the psychological aspects of obesity.

Studies Related to Psychology of Obesity

According to Allon (1979), the visible evidence of fatness in contemporary America often make the discredited overweight person different from others and less desirable than he/she might be. Obese and overweight individuals are chastised and held responsible for their lack of self-control which assumingly leads to this voluntary, self-inflicted disability. The common bond among the obese is that they are discriminated against, made to feel that they deserve such discrimination, and that they come to accept their treatment as just (Allon, 1979).

Modern culture has little tolerance for the obese

person (Allon, 1979; Brownell, 1982; and Stunkard, 1976). The enormous pressure to be thin is exerted in subtle ways through television shows, movies, advertisements, and other ways in which thin people appear to prosper (Brownell, 1984). There is more direct pressure by manufacturers of diet foods and proponents of weight-loss schemes, through ridicule by others, through reduced selection of clothes, and from the demands of family, friends, and even strangers that the obese or overweight person lose weight (Brownell, 1984). It is a rare overweight person who does not fashion into this a persistent concern with dieting (Brownell, 1984).

The social and psychological effects of obesity can be difficult in both adults and children (Brownell, 1982; Stunkard, 1976; and Allon, 1979). Obese children are teased, excluded from peer groups, and picked last for athletic activities (Brownell, 1984). It is usually the obese children who seek excuses to avoid gym class because of the intense shame they feel about their bodies. The bias against obesity is pervasive and occurs even in young children (Brownell, 1984). Children as young as six rate obese children as less likable than children with a variety of physiological handicaps and children attribute to a picture of a fat child that they do not know, labels like lazy, sloppy, cheat, forgetful, dirty, and stupid (Maddox, Back, & Liederman, 1968; Staffieri, 1967). Youngsters feel that obese children are to blame for their condition and

that the obesity stems from overeating (Edelman, 1982).

There is documentation of outright discrimination against obese persons in college admissions (Canning & Mayer, 1967) and in employment (Tucker, 1980). Physicians prefer not to manage overweight patients and further do not expect success when or if they do treat overweight persons (Maddox, et al., 1968). This self perception and stigma of overweight are best described in the results of a study conducted by Allon (1979). The author observed and interviewed children and parents in a weight control clinic and concluded with the following concepts of stigma related to obesity:

1. Overweight as an exclusion focus in social interaction.
2. Overweight as a reflection of a negative body image.
3. Overweight as overwhelming others with many mixed emotions.
4. Overweight as clashing with other qualities of the person.
5. Overweight as an equivocal and uncertain predictor of joint activity of overweight and persons of normal weight.
6. Overweight viewed as one's own responsibility which deserves punishment by others as well as by oneself.
7. Overweight viewed as an illness and not one's own

responsibility, which merits treatment and help given by others, especially parents and professional experts.

8. Overweight viewed as one's own responsibility and as an illness that requires the joint efforts of oneself and others, especially parents and professional experts.

The preceding list indicates the tremendous pressures and expectations of the obese. Although the study involved interviews with adolescents, the data and conclusions are most relevant to this study. When treatment is initiated either by the physician, individual, spouse, or whomever, an expectation is assumed. The basis of this study deals with personality factors of the individual. Therefore, the use of a personality profile instrument would assist in identifying positive factors of personality and to assist in program development for both regainers and maintenance of weight loss.

The combination of a personality index and an individualized treatment plan should promote an internal feeling of satisfaction for the obese or overweight patient. So often the stigma associated with obesity is the force behind resistance to treatment. In addition, recognition of key personality factors may provide assistance on relapse prevention and long-term weight loss. The following summarization by Mahoney and Mahoney (1976) shows that clear generalizations exist. These generalizations in

turn reinforce the defeatist attitude of the obese. These authors assumed that:

1. Obesity is a learning disorder, created by and amenable to principles of conditioning.
2. Obesity is a simple disorder resulting from excess calorie intake.
3. The obese individual is an overeater.
4. Obese persons are more sensitive to food stimuli than are non-obese individuals.
5. There are important differences in the "eating style" of obese and non-obese persons.
6. Training an obese person to behave like a non-obese one will result in weight loss.

Realizing that the patient is to be treated as a unique person, treatment can begin hopefully with less psychological strain. A profile can be used to isolate an individual's psychological characteristics to assist him or her in weight loss and maintenance.

Leon (1982) reviewed and evaluated the numerous publications that have been written over the past decade about the behavior or personality of obese persons. Such a review is essential in order to relate the complexities of the entire personality. These efforts are significant to the current study in order to identify relevant personality attributes.

Leon (1982) emphasized that consistencies and disagreements exist in the literature. These studies

emphasize the need that the obese or overweight should not be considered unitary in the treatment phase. Treatment should proceed with each individual as a unique person looking at distinct personality features that may sabotage treatment outcomes or contribute to relapse. However, there are factors in the personality or behavior that are similar. These behaviors can include lack of satiety with a lack of control toward eating; obsession with certain foods and obsession with dieting; and lack of sufficient or sound nutrition and diet-related knowledge (Stunkard, 1980). These factors strengthen the need for behavior modification specifically designed for each obese patient (Brownell, 1982).

The externality theory as investigated by Schachter and Rodin (1974) indicates that no relationship exists between internal state and eating behavior because the obese person's eating behavior is in large part under the control of external, environmental cures unrelated to the physiological state of hunger (Schachter & Rodin, 1974). Therefore, externality is a general personality trait rather than a trait specific to eating behavior (Schachter & Rodin, 1974).

Leon (1982) discussed in great detail the many studies conducted to predict behavior of the obese person. The studies noted a span of twenty years of research. Some general conclusions from this lengthy research are worthy to mention. The question raised in the majority of studies

reviewed has been whether there are psychological or behavioral characteristics that differentiate obese persons from those of normal weight (Leon, 1982). The question of validity was raised because of the fact that studies were predominantly female-oriented in weight loss clinics in hospitals and male-oriented in college control settings. Another question raised dealt with the subject's weight reference, that is, overweight or obese.

Brownell (1984) suggested that a key factor in the eating behavior of the obese is that of eating as an emotional release of tensions. This suggestion encompasses a wide variety of individuals, that is, those who eat due to tension and those who relate eating to the central focus of their tension. This further strengthens the notion that there is no consistent personality constellation or pattern of underlying pathology in obese persons (Leon, 1982). Stunkard (1980), in describing three different types of binge eating patterns (night eating syndrome, binge eating, and eating without satiation), relates the diversity of behavior in obese and overweight individuals and the difficulty inherent in generalizing about them as a unitary group. In spite of the opinions of some researchers who claim that a diversity exists in personality (Stunkard, 1980), a number of studies have been conducted on the characteristics of obese persons using the Minnesota Multiphasic Personality Inventory (MMPI) (Atkinson & Ringuetti, 1967; Held & Snow, 1972; Levitt & Fuller, 1965; Werkman &

Greenberg, 1967). The findings were consistent in noting a significantly higher elevation on the Psychosthenia (Pt) scale for obese subjects. The Depression (D) scale was significantly elevated in three of the four studies cited: those of Atkinson and Ringuetti (1967); Held and Snow (1972); and Werkman and Greenberg (1967). However, the results may be accounted for by a self-selection factor in that the weight status of the persons studied had been labeled as a problem in need of change (Leon, 1982).

Some other researchers also reported an association between depression and obesity (Clancy, 1965). However, Silverstone (1968) and Holland, Masling and Copley (1970) found no greater psychiatric disturbance in a group of obese women, than among normal weight and hyperobese women.

The use of the MMPI in a study conducted by Johnson, Swenson and Gastineau (1976) did not reveal a personality pattern characteristic of that group. A diversity was demonstrated instead. Pomerantz, Greenberg and Blackburn (1977) reported a relationship of the M-F (Masculine-Female) scale of the MMPI to assertiveness. The studies cited have a common factor in attempting to predict success by personality characteristics. The psychological tests used were not specific to any particular trait.

Another assessment instrument, Terman-Miles M-F Scale, was used by Lefley (1971). Lefley found that obese women scored higher in the feminine direction. Leon (1982) attributed this finding to the great degree of emotional

reactivity.

The preceding section of this review summarized the issues dealing with personality of the obese population. The conclusions of the many research studies indicate that there are very few personality characteristics that obese persons share. It is assumed that no one trait is common to this population that can be considered causative in the development of obesity. However, known traits can be used to assist in treatment and relapse prevention for both groups.

According to Leon (1982), the evidence strongly suggests that obesity and overweight are not a unitary syndrome. Leon (1982) states that research efforts would be more profitable if the type of obese person being studied was carefully specified. The literature review presented thus far strongly suggests that researchers have concluded that personality and obesity are not consistent. It is more rational to correlate a method of treatment with specific personality types. This study is the beginning of a design to identify personality characteristics to assist in the development of a more individualized treatment approach.

A symposium on obesity conducted by McBride (1982) discusses in detail the psychological and physiological aspects of obesity oriented toward women. The information from this symposium is included here since this study includes a large sample of women. Traditionally more women

seek assistance with weight control than men, 80% versus 20% (McBride, 1982).

McBride discussed the history of the female physique by explaining the purpose of adiposity. Females have twice as much fat as males by the end of adolescence (Beller, 1977). The deposition of adipose tissue is a preparation for child-bearing. The female hormones, estrogen and progesterone, are fat-producing and fat-hoarding hormones (McBride, 1982). Because of these normal physiologic occurrences, it is no wonder that fifty percent of the women in the United States are estimated to be overweight (McBride, 1982). The weight loss industry is geared toward women. Most of what is written in the popular press, and interestingly, in the professional literature, focuses on women (McBride, 1982).

McBride summarized five key issues affecting women's physical appearance as a wife and mother. They are: (1) a time of conformist standards of appearance; (2) a period when a woman may want to be "more" than the little woman; (3) motherhood itself is fattening; (4) a time of restricted activity, when cooking is emphasized; and (5) a period when the woman is supposed to be the nurturer par excellence (McBride, 1982). Simply, women have a multi-faceted role of mother, wife, professional worker, etc. They must accept the responsibility and standards of each role and they must look the part. Physically, their bodies are designed to accommodate all of the activities and yet,

psychologically, many women battle against the odds. The odds being the gradual weight gain over a period of years or the sudden weight gain if the former habits of restricted calorie intake cease (McBride, 1982).

The psychosocial aspects of women compound the complexities of treatment. The difficulty in compliance (dietary compliance) relates heavily on the five key issues discussed above. The problems relate not only to the social and environmental aspects but also the internal demands and self-inflicted expectations. It is important to discuss the psychological aspects in the literature that are scientifically hypothesized and relate such theories to this research.

Studies Related to Treatment of the Obese and Overweight Population

Traditionally, treatment plans for obese patients for weight reduction simply involved a restricted calorie diet that enabled a calorie or fat deficit for the individual. The simplest way to reduce calorie or fat intake for the obese person is the use of a low-calorie, low-fat diet (Brownell, 1984). The nutritionally sound diet is one that encompasses a balance of nutrients through the composition of readily available foods. Such a diet should enable long-term maintenance of weight control. However, this premise is easier stated than accomplished and because of this fact many obese individuals find it easier to fall

prey to the bizarre diet revolutions presented to them daily (Brownell, 1984). Each time a diet is followed, the body metabolism adjusts to the lower calorie intake (Stunkard, 1980). Consequently, each diet followed inhibits the ease of weight loss. The vicious cycle continues and the individual faces the trauma of rebound weight gain (Brownell, 1984; Stunkard, 1980).

This weight loss/weight gain, the yo-yo syndrome common to the obese population, can frustrate not only the patient but also the professional (Brownell, 1984). This rebound effect occurs in both the ridiculous diets seen advertised in lay literature and the sound conventional diet prescribed by physicians and dieticians. The basic reason for this occurrence is simply lack of knowledge of eating behavior. The patient follows a diet plan, becomes frustrated and then returns to the former bad eating habits that presumably had led to the weight gain (Brownell, 1984).

This rebounding syndrome creates implications for the treatment of obesity. Most conventional treatments for obesity were found to be ineffective (Bray, 1982; Brownell, 1984; Stunkard, 1980). Diets, dietary counseling, exercise prescription, psychotherapy, and exhortation by professionals help relatively few patients (Brownell, 1984). Stunkard (1976) issued the pessimistic verdict that less than 5% of patients lose much weight and then maintain that loss. Currently these figures remain about the same;

however, with increased knowledge about nutrition and metabolism promising approaches have appeared (Brownell, 1984). These involve concentration on social support, physical activity, behavior modification, with emphasis more on low-fat diets (Brownell, 1984). It is crucial to identify the personality of the patient and match it with appropriate nutritional, psychological, and medical approaches (Brownell, 1984; Stunkard, 1980). Brownell (1984) suggests a more comprehensive treatment approach.

Some patients are more likely than others to profit from treatment. Having criteria for selecting patients is useful. The process is imperfect, but it is important because working with a person who fails has disturbing consequences. (Brownell, 1984, p. 410). These failures offer knowledge as well. It is imperative to understand the vast implications of failure to not only lose weight but what enables a patient to be successful at long-term weight control. Weight loss followed by regain may be more dangerous than static obesity (Brownell, 1984). In addition the psychological trauma to the patient only adds to the legacy of failure which characterizes most dieters. Also the failure may convince the patient that the problem is intractable, therefore decreasing the chance that treatment will be pursued later when motivation is higher (Brownell, 1984). The challenge rests with developing a more multi-disciplined approach utilizing nutritional, physiological, and medical resources. It also requires a

more in-depth analysis of the unique personality and behavioral profile of the patient. This in-depth perspective could facilitate encouraging continued weight loss maintenance and assist regainers in finding a program that works to increase self motivation.

In the past exercise and behavioral therapy have been identified as crucial elements for weight control. A review of the importance of these two factors is warranted to validate their inclusion into any comprehensive treatment program.

Exercise for Weight Control

Obese persons are generally less active than their thin counterparts (Brownell, 1984; Stern, 1983; Thompson, 1982), but it is not clear whether this is a cause or a consequence of obesity. It is clear that exercise confers many benefits (Astrand & Rodahl, 1977; Brownell, 1984; McArdle, Katch & Katch, 1981; Scheuer & Tipton, 1977). First, exercise increases energy expenditure but prolonged and vigorous activity is required to expend the calories consumed in even a small meal (Brownell, 1984). However, exercise may enhance the thermogenesis produced by eating and may increase metabolic rate for some time after the activity has ended (McArdle, Katch & Katch, 1981; Rodin, 1979; Stern, 1983). Second, weight loss by diet alone comprises approximately 75% fat and 25% lean body tissue, depending on the composition of the diet and on individual

variability (Astrand & Rodahl, 1977; McArdle, Katch & Katch, 1981; Stern, 1983; The loss of lean tissue can be decreased to approximately 5% by adding exercise (Brownell, 1984). Third, exercise can lower blood pressure (Scheuer & Tipton, 1977), change blood lipid levels (Brownell, 1982), increase self-esteem (Folkins & Sime, 1981), and improve almost every index of coronary efficiency (Scheuer & Tipton, 1977). Fourth, exercise may help suppress appetite (Rodin, 1979).

The most important benefit of activity may be its effect on metabolic rate (Brownell, 1984). Basal metabolic rate can decline by as much as 20% within 14 days of energy restriction (Bray, 1982). This is a large decrease in energy expenditure, which makes dieting increasingly difficult (Brownell, 1984). There is evidence that exercise can offset this decline (Brownell, 1984). Stern (1983) and colleagues have been the only group to study this effect and the results are very encouraging. Subjects who added exercise to a dietary regimen increased metabolic rate to at least the predicted levels (Brownell, 1984).

Exercise may also interact with genetic and dietary factors in positive ways (Rodin, 1979; Stern, 1983). Animals exposed to the "supermarket diet" are less likely to become obese if exercised (Stern, 1983). In a remarkable experiment, Stern, Dunn and Johnson (1983) actually prevented the expression of a genetic trait for obesity by exercising mice prior to the stage when their juvenile

onset obesity would otherwise have occurred.

Despite the well-known benefits of exercise, adherence to exercise programs is surprisingly poor (Brownell, 1984). Approximately 50% of people drop out of exercise programs, even when compelling medical reasons like recovery from a myocardial infarction should be a powerful incentive (Brownell, 1984). Gwinup (1975) reported that 68% of obese women dropped out of a one-year exercise program requiring only walking.

These research efforts indicate a strong need to match personality characteristics of an individual with an appropriate exercise program.

Behavior Therapy for Weight Control and Maintenance

According to Brownell and Wadden (1983), behavior therapy originated from the work of Skinner in the United States, Wolpe in South Africa, and Eysenck in England. The landmark study by Stuart and Guire (1978) was the first to apply the principles of behavior therapy to the treatment of eight overweight individuals. Since that original research in 1967, more than 75 studies were published on behavior therapy for weight control by the mid-1970's. This number had more than doubled by 1980 (Brownell & Wadden, 1983).

As stated earlier in this review, the major premise of weight gain and rebound weight gain after dieting rests on

the presumption that obesity and overweight are due to excess food and fat consumption resulting from faulty eating habits. Learned behaviors hypothesized to contribute to this phenomenon are, for example, rapid rate of consumption, large bites, frequent feeding, ingestion of large quantities of food and fat foods, etc. (Brownell, 1984; Wooley, Wooley & Dyrenfnorth, 1979). These behaviors reinforce the pleasure of eating and mask the real stimuli for ingestive behavior.

Wooley, et al. (1979, p. 11) explain that "the reinforcing consequences are immediate, whereas the aversive ones are delayed." This has led to the treatment strategies best summarized by Wooley, et al., as follows:

1. Provide immediate reinforcement for appropriate eating or food abstention (e.g., money, social approval, self reward).
2. Diminish the strength of pleasure as a reinforcer for eating (e.g., aversive, conditioning to food tastes, covert conditioning).
3. Make long-term negative consequences more salient at time of eating (e.g., undesirability of fatness and value of thinness).
4. Eliminate food cues that serve as discriminative stimuli (e.g., ridding the house of fattening foods).
5. Narrow the range of discrimination stimuli for eating by restricting the time and place in which

eating occurs.

Treatment strategies which use behavior modification may vary in structure and intensity. The strategies outlined above by Wooley, et al. (1979) are generalizations of the specific techniques used by professionals.

Brownell and Wadden (1983) describe the behavior modification approach as a comprehensive treatment that attends to the patient's attitude and feelings. The course of events includes: assessment of eating patterns, diagnostic evaluation, and then treatment. Brownell and Wadden summarize treatment altering the ABC's of behavior: the antecedents (events which prompt eating), the behavior itself (eating topography), and the consequences (events that follow eating).

Intervention or techniques of treatment include: self-monitoring (food diary which includes meal, food, time, place, people, feelings, activity and calories), stimulus control (external cues), slowing the rate of eating, reinforcement, and attitude restructuring (Brownell & Wadden). The scope of this entire process is positive restructuring of eating habits to allow for gradual weight loss. It is assumed that by the altering of eating habits to promote weight loss, the process should be lifelong. This is the key point and strength of behavior therapy.

Brownell (1984) also notes other advantages aside from weight loss. First, attrition from treatment, which ranges from 50 percent to 80 percent in traditional programs, is

approximately 15 percent in behavioral programs. Second, in contrast to the negative emotional reactions experienced in traditional programs, patients in behavior therapy programs tend to show improved psychological functioning (Brownell, 1984).

Brownell's research indicates the need for a social support system (1982). This research demonstrated that the inclusion of spouses in the standard treatment program produced significantly greater weight loss at three- and six-month follow-up evaluation. The treatment with no spouse participants produced less weight loss.

The papers on behavior therapy seem endless. The following conclusions on this approach to management of weight loss are summarized:

1. Initial weight loss is approximately 11 pounds, or 1 to 2 pounds per week.
2. The average weight loss is fairly well maintained for at least one year.
3. Relatively few patients, perhaps around 25%, continue to lose after treatment.
4. There is great interindividual variability in weight loss.
5. No variable consistently predicts outcome.
6. The comparative long-term effects of behavior therapy cannot be determined because long-term results of other approaches are not available.
7. Behavior therapy improves psychological

functioning.

8. Only about one-half of behavior therapy programs use specific maintenance techniques.
9. Behavior therapy has reduced attrition dramatically.

In summation, most of the work on behavior therapy is best described and condensed by Brownell (1984) and Stunkard (1980). Their research deals primarily with individuals and groups in the clinical setting.

Leon (1982) confirms the success of behavior therapy for weight reduction. She also expresses a need for cognitive behavioral restructuring in order for the therapist to deal with client issues such as the decision-making process, the commitment to change one's problem behaviors, and strategies for developing effective self-control techniques. The final suggestion was to further investigate the development of behavior modification treatment programs. This study addresses this suggestion in an indirect manner. The present behavior modification programs are not tailor-made for the patient. The programs are structured and designed for the average or typical individual. The researcher intends to extend Leon's suggestion by using this study to promote the decision-making process. Behavior modification should be more individualized and flexible (Abramson, 1977). The use of a psychological profile would further assist in the design of a weight-loss and maintenance program to meet specific personality

characteristics for both regainers and maintainers.

In lieu of this suggestion, Brownell (1982) also addresses the issue of need for studies in short-term therapy. Brownell (1982) states that such studies are desperately needed and asserts the following:

1. Investigators are forced to search for a single procedure that produces both short-term and long-term results. This search ignores the possibility that different processes may influence initial change and the maintenance of that change.
2. Innovative short-term approaches will be ignored if maintenance does not occur, so researchers will be unwilling to experiment with new treatments.
3. Researchers should not be required to do long and costly follow-ups of new procedures (or replication of earlier procedures) if the short-term results are poor.
4. The necessity of long-term studies will discourage young researchers and graduate students from studying obesity. Career imperatives do not reward studies with long delays before publication.
5. Causal inference is simply not possible after long periods. If an obese person loses 50 pounds and still weighs 50 pounds less 10 years later, it is difficult to attribute the change to the program. The person may have gained and lost the 50 pounds

several times in the 10-year span.

6. The focus on maintenance assumes that there are weight losses worth maintaining. This is simply not the case for many patients (Brownell, 1982).

These conclusions by Brownell strongly suggest a need for further reseach not only in weight loss benefit, but also investigation of the dynamics of maintenance factors.

Rabin (1971) examined behavioral techniques for weight loss and tested for similarities in personality utilizing the 16 PF. This study suggests consideration of different personality traits because compliance in weight loss may be stronger if the method of treatment is more suited to the individual personality type. Rabin's research concluded that the personality inventory revealed all subjects to be significantly different from the general population in intelligence and expedience. Subjects completing the study were more dependent, suspicious, apprehensive and tense than those who dropped out of the study. These correlations suggested a need for information that will address patients who have completed and maintained a weight loss regimen. Rabin's study addressed a specific personality factor and does not compare the factor to regainers or drop-out individuals. The relationship addressed is the method of treatment which correlated best with a personality factor.

It is evident that eating behavior and individualized treatment are essential in the behavior modification

treatment plan. Such factors help patients find the most comfortable way of reducing or stabilizing intake. According to Wooley, et al. (1979) there is no normal or set standard approach that is forced on the patient. If no two patients are exactly alike, one treatment plan should not be used. The identification of major facets of an individual should further explore the uniqueness of the patient and tailor-design a behavioral, nutritional and diet treatment plan with these personality characteristics in mind.

According to Wooley, et al. (1979), the psychology of obesity extends beyond ingestive behaviors and this takes into account the cultural and social pressures of the obese to behave in certain ways. Each patient presents himself or herself with a background that can foster treatment or defy treatment.

Studies Related to Demographics of Weight Loss Maintenance

The preceding discussions emphasized studies in the area of obesity. Limited research exists which identifies psychological or demographic determinants for relapse prevention or long-term weight loss maintenance (Brownell, 1984). However, numerous studies present factors related to short-term weight loss. This study looked retrospectively at those who have successfully maintained weight loss in hopes of learning more about various personality factors and demographics that may contribute to their

success.

A study by Marston and Criss (1984) could not discriminate maintainers from regainers in terms of demographic characteristics. No differences were noted in terms of sex of subject, marital status, continued involvement in a program during maintenance, satisfaction with body image, enjoyment of eating, spouse involvement in subject's weight loss efforts, subject's perceived evaluation of self by spouse, age of onset of obesity or weight gain, speed of weight loss, and life stress and mood ratings. This study however, did identify that maintainers were more likely to exercise several times per week and less likely to eat for emotional reasons. Another study by Schacter (1982) reported that maintainers tended to have had prior experiences in reaching goal weight. Other retrospective research efforts (Leon & Chamberlain, 1983; Stuart & Guire, 1978) substantiate that few differences exist in terms of situational or demographic characteristics. All these studies emphasize the need for further research on factors related to avoiding relapse of weight loss. The authors also identified problems with unrepresentative samples and methodological problems in not only their own research efforts but also other related weight loss studies (Leon & Chamberlain, 1983; Marston & Criss, 1984; Stuart & Guire, 1978). With only 3% to 5% of patients experiencing success keeping weight off, there exists a limited sample of the population to evaluate

(Brownell, 1984).

Another area that needs to be addressed is the concern about which diet program is successful. In general all diets work for some people (Brownell, 1984; Stunkard, 1980). Marston and Criss (1984) also substantiate that whether under medical supervision or without, most diets work depending on the individual's commitment. This may also indicate a possibility that through some kind of subtle knowledge a patient chooses a program that somehow fits his or her personality.

> Every approach works for some people. . . identifying those people for whom a specific program is appropriate is difficult and there is little guidance from research. (Brownell, 1984, p. 410)

The study searched for distinctions between regainers and maintainers in order to ultimately create a feasible psychological and demographic profile which could lend assistance in individualization of multidisciplined treatment approaches. Research indicates that screening those individuals who are willing to work with a specific program's guidelines can be beneficial to the client and to the success of the program (Brownell, 1984; Paulsen, 1988).

In the current effort, creating a profile may assist both regainers and maintainers. It would not be used to eliminate unsuccessful attempts due to lack of motivation. Instead screening would facilitate the professional's knowledge of the client's unique personality factors, both

strength and weakness, to assist individualization of the program design. If a client believes a weakness can be turned into productive information about how to increase his motivation to lose weight or to reach a realistic weight goal, relapse can be prevented. Bandura (1977) states when a person believes specific behaviors are beneficial and believes he/she can do these behaviors, behavior change is more likely to occur.

Another important variable to address is the element of time. Maintenance of weight loss over time has received little attention by few researchers and generally has been restricted. The follow-up evaluation period is one year or less (Brownell, 1984). It seems essential then to look at individuals who have maintained lost weight for at least one year or more. Other research indicates that physiological factors may influence weight which is lost or gained within one year's time (Keesey, 1980; Stunkard, 1980). After one year of consistent weight maintenance (within five pounds), set point and fat cell theories indicate a potential for longer-term metabolic changes (Brownell, 1984; Keesey, 1980; Stunkard, 1980).

The failure of research on weight management to find a generally effective intervention may reflect a lack of consideration of subject variables (Bruch, 1973; Kincey, 1980). Weight change appears to result from not just a particular treatment but rather the interaction of the treatment and the individual client. Further, the factors

which contribute to the initial reduction are likely different from those affecting maintenance of this loss. Prediction of weight change may require simultaneous consideration of several variables and may be specific to the intervention employed (Abrams & Follick, 1983; Kingsley & Wilson, 1977).

An important research effort to the present study is work done by Bolocofsky, Coulthard-Morris and Spinler, in 1984. That study evaluated the utility of using the personality data from the 16 PF and Rotter's I-E scale along with the variables of marital status, initial weight and age of onset of obesity to predict weight loss, weight maintenance and drop-outs in two weight management programs. One approach utilized a behavioral method, the second used hypnosis, and the third combined behavioral with the addition of hypnosis. Of particular interest was whether successful prediction would be specific to the type of intervention and if the variables which predicted weight loss during treatment would be the same as those predicting further weight change after treatment. The results of this study supported the utility of a multidimensional approach to predicting successful weight management. Combinations of personality and demographic variables significantly discriminated between subjects who completed the weight program and those who dropped out, and predicted weight loss and maintenance for each of the treatments. Although one set of variables successfully distinguished drop-outs

in both conditions, the best predictors of weight loss differed from the best predictors of weight maintenance and were specific to the intervention employed. Only self-control, self-sufficiency and lower initial weight were related to weight loss and maintenance, irrespective of treatment. Results indicated that dropouts were more external in locus of control, emotionally less mature, showed lower persistence, poorer self-insight and less social awareness, exhibited a higher general level of anxiety, and reported being overweight at an earlier age (Bolocofsky, et al., 1984).

Subjects in the weight loss methods tended to be more internal in locus of control, higher in assertiveness, independent, sensitive, trusting, imaginative, more emotionally mature, exhibited higher self-sufficiency and weighed less at the onset of the study.

Maintainers were more internal in locus of control, practical, and self-reliant, tended to be more objective, were married and weighed less at the beginning of treatment, and tended to take responsibility for their weight. This study suggests that research needs to continue to isolate the subtle differences between weight loss and weight maintenance.

Studies of personality characteristics and weight loss have utilized a variety of measuring devices. However, in many cases there appears to have been little use of empirical observations or previous research exists in the

selection of the instruments (Bolocofsky et al., 1984). The Sixteen Personality Factor Questionnaire (16 PF)--utilized in the previous mentioned study (Bolocofsky, et al., 1984)--along with marital status, initial weight and age of onset of obesity, exercise, measured most of the demographic variables previously shown to be related to weight change and appears likely to be useful in relation to weight maintenance (Kelley, 1975).

Two other significant research efforts warrant mentioning in this study. Armillay (1985) examined weight loss and personality in women. She utilized the 16 PF to identify the personality trait of dependence/independence to support the premise that patients might have greater success in weight loss if the method of treatment is consistent with a personality trait studied. Results indicated that the appropriate treatment method was significantly related to the personality trait of dependence/independence. The use of the proper method also increased the compliance factor of those patients who were indexed as compliant.

This study (Armillay, 1985) was limited to assessing only one factor of personality in relation to two treatment programs. However, this was a significant study because it established that identification of a trait may assist in the success of treatment. If a cluster of traits can be identified as unique to regainers or maintainers, it is possible that an effective treatment program could be com-

bined with this profile.

Weitzman (1977) used the 16 PF to identify various personality factors relevant to weight loss maintenance. Weitzman included numerous variables related to demographics and eating behaviors. No significant relationships were found in this study. Several problems existed in this research attempt including methodological and problems associated with sample size. The researcher appeared to have problems in collecting data along with limited assessment procedures on numerous variables. This study also utilized global scores from the 16 PF, which may indicate questionable results. The strongest conclusion suggested by the researcher demonstrated that subjects did not know much about nutrition or effective weight loss programs.

Summary

The previous literature review examined the nutritional, physiological, psychosocial and psychological concomitants of obesity. In addition, factors relating to weight loss and weight maintenance were addressed.

It was determined that nutrition plays a critical part in the metabolic process of efficient physiological functioning. In this area, the review examined the various genetic factors which may produce overweight and obesity in an individual. Specific hormonal disorders, dietary deficiencies, diseases, and various medications may predispose some people to obesity. Traditional obesity has been

linked to reduced activity, cultural food habits, over-eating, and the aging process.

In this review updated research was presented which validated the powerful biological pressure to maintain an ideal body weight. These included the set point and fat cell theories. This research indicated that dieting may be useless against the powerful internal resistance to losing weight.

This literature review also addressed the psychosocial causes of the distress for the obese. It was suggested that tremendous pressures, unrealistic expectations, and frustrations are experienced by obese individuals. In addition, women tend to experience more social pressure to be thin, at the same time having strong physiological pressures to be heavier.

Personality and behavioral aspects of the obese were identified in several studies. There were no significant differences in personality or behavior in the obese compared to the non-obese.

Rebounding after a diet creates implications for treatment. It was stated in this review that less than 5% of those who lose weight maintain that loss for more than a year. Another study identified that any diet can work for some people, suggesting the development of a multidisciplined approach to treatment.

In other research reviewed, promising approaches for long-term weight loss were indicated. These factors

included social support, exercise, behavior modification, matching patient to program, and low-fat diets.

In this review, exercise and behavior modification were examined in detail as critical elements in sustained weight loss. This review addressed several studies that identified the subtle differences between those who lose weight and those who maintain weight. Results indicated a need to look at the unique personality and demographic variables that may assist in designing a treatment program to match an individual's personality. These studies indicated a need for further research into the factors associated with weight loss maintenance.

In conclusion, there appears to be a lack of comprehensive studies on obesity with little emphasis given to long-term weight maintenance. An obvious need for more research in the areas of the physiology of obesity, weight loss and maintenance. In addition, the subtle interplay of the personality of an individual along with genetic programming factors, warrants further definition to encourage more realistic weight control. This dissertation examined the psychological and demographic determinants of regainers and maintainers to assist in the future development of more effective psychological interventions and treatment programs for relapse prevention of weight loss.

CHAPTER III

METHODS

Chapter 3 will present the methods and procedures of the study. For the purpose of presentation this chapter has been divided into five sections: namely, statement of the null-hypothesis, description of the subjects, description of the research instrumentation, description of the procedures, and treatment of the data.

Statement of the Null Hypothesis

For the purpose of this study, the hypothesis was stated in the null form.

H_o: Groups of maintainers and regainers cannot be differentiated on the basis of personality factors as defined by a discriminant function.

Description of the Subjects

The sample consisted of 80 female and male adults who were previously overweight or obese according to the definition of the study. The subjects were residents of a major southwestern metropolitan area. All maintainers and regainers were Caucasian.

The sample consisted of 65 percent females and 35

percent males. There was approximately an equal number of subjects represented in the maintainer and regainer groups (41 maintainers and 39 regainers). In terms of marital status, 74 percent of the subjects were married, 26 percent were single, divorced or widowed. Additionally, the ages of the subjects ranged from 25 to 71. The average age was 41 years. Forty-seven percent of the subjects made between $21,000-30,000 a year, 23% less than $20,000, and 30% reported income levels of $31,000 or above.

In regard to the degree of exercise, 80 percent of the subjects participated in some form of exercise (i.e., running, aerobics, swimming, biking, walking, weights, competitive sports). Approximately 20 percent of the subjects did not participate in any exercise. The most popular exercises were walking and aerobics. Approximately 47 percent of the subjects participated in these activities. Approximately 56 percent of those studied exercised at least 2 to 4 times per week. In terms of duration of exercise, 40 percent maintained the length of exercise from 45-60 minutes, with 30 percent exercising 15 to 40 minutes each exercise session.

Description of the Research

Instrumentation

Two instruments were used in the study. The first was the Sixteen Personality Factor Questionnaire (16 PF) (IPAT, 1986). It was self-administered with simple instructions.

A second instrument was a self-administered questionnaire which identified relevant demographic factors. The 16 PF was originally developed in 1949 by Raymond Cattell through factor analysis of items that were designed to measure personality source traits (Buros, 1985). Source traits are believed to be the inherent factors underlying more manifest behavioral traits. They are derived from factors rotated to oblique simple structure (Zuckerman, 1985). The current test is scorable on the original 16 traits plus 5 broader secondary trait scores derived from factoring the primary traits. These secondary traits were the primary focus of interest in the present study.

The 16 PF has undergone six revisions since its original publication. Most forms of the 16 PF contain items which were written to provide a forced-choice option (Buros, 1985). Butcher (1985) states the content of the test is interesting and original. Five forms of the 16 PF are available. Form A was utilized in this study which contains 187 items requiring about one hour to administer. Form A contains 3 validity scales: a fake-bad scale, a random responses scale, and a motivational distortion scale (fake-good) scale. The motivational distortion scale is most valuable to this study. Applicants may attempt to respond in a way to create the most favorable impression. The 16 PF scale measures 15 separate (independent) source trait dimensions, an abstract reasoning (intelligence) factor, and 5 second-order factor traits: introversion-

extraversion, anxiety, tough poise, independence, and control (IPAT Staff, 1986).

As a psychological research scale, the 16 PF is very well documented with a Handbook, Manual, and a Tabular Supplement for the forms (Buros, 1985). Butcher (1985) described the 16 PF as a venerable research instrument that has stood the test of time. He stated that there is a widening research base for the test. The test developers and publisher have excelled at making the material and scoring services readily available to potential users (Butcher, 1985). The test publisher and official scoring system is generally a "user-oriented" service. This "user friendly service" was a major advantage for the present study. Assessing individuals in a physician's office or weight clinic calls for an instrument that can be quickly administered and scored to provide immediate feedback for program development.

An extensive program of research on the 16 PF has yielded an enormous body of data on the test. Reports indicate that the 16 PF provides substantial normative scores on relevant normal populations (Butcher, 1985). Butcher also recommends using the longer forms (A & B) with higher reliability and accuracy correlations based on alternate test form and test-retest analyses. Statistics indicate reliability of .80 for short intervals (Butcher, 1985). These intervals were based on immediate retest to two-week intervals (Buros, 1985). Longer intervals of

reliability (2 months to 8 years) showed a .52 reliability. Two classes of evidence for the validity of the 16 PF are considered. Based on a sample of 17,381 males and females, there is adequate construct validity and criterion-related validity in the structure of the test, according to Krug and Johns (1986). Butcher (1985) also concludes that the multiple empirical examinations of the 16 PF demonstrate that the number and nature of the personality dimensions the 16 PF taps, are consistent with the original underlying model.

Other research indicates that the primary factors reflect lower reliability than the secondary factors. Peterson (1985) identifies Cattell's primary factors as failing to show reasonable replication across age. Eysenck, White, and Souief (1969) factor-analyzed Cattell's 16 PF items and found that the resultant primary factors were not readily replicable from males to females. However, all of the above studies identified the broader second order factors as having more impressive validity coefficients ranging from .70 to .95 across age and sex. Similar ranges were indicated in a 1986 study by Krug and Johns. The second-order factors appear to exhibit the more valid factoring of the 16 personality factors. Therefore, this study assessed only these five personality dimensions.

In order to more clearly interpret a profile, the following is a capsule description of the second-order scores. These factors are of interest to this study

representing a factoring of the first 16 factors of personality.

Second-Order Factors

Extraversion. Low score direction: Introversion. This person tends to be shy, self-sufficient, and inhibited in interpersonal contacts.

High score direction: Extraversion. This person is socially outgoing, uninhibited and good at making and maintaining interpersonal contacts.

Anxiety. Low score direction: Low Anxiety. People who score low tend to be those whose lives are generally satisfying and those who are able to achieve those things that seem important to them. Extremely low scores can mean lack of motivation.

High score direction: High Anxiety. People who score high are high on anxiety; as a rule, they are dissatisfied with the degree to which they are able to meet the demands of life and to achieve what they desire.

Tough Poise. Low score direction: Emotional sensitivity. People who score low are likely to be strongly influenced by their emotions, gentle, sensitive to own feelings as well as others.

People who score high are likely to be enterprising, decisive and resilient personalities. They are influenced by facts rather than feelings.

Dependent. Low score direction: Subduedness -

Dependent. People who score low are group-dependent, chastened, passive personalities. They desire and need support from other persons and they orient their behavior toward persons who give such support.

High score direction: Independence. People who score high tend to be aggressive, independent, daring, incisive people. They seek those situations where such behavior is at least tolerated and possibly rewarded, and they are likely to exhibit considerable initiative.

Superego/Control. Low score direction: Low control. People who score low on this factor typically do not act according to other values or out of a sense of duty. Nonconformists who bend rules or develop their own set, tend to be flexible but not be as self-disciplined.

High score direction: High Control. People who score high typically have strong superego controls; that is, they have internalized the rules of the milieu in which they function. They are reliable, but may not bend the rules. They may be so controlled as to be perceived by others as rigid or moralistic.

A second instrument used in this study to collect demographic characteristics was a self-administered questionnaire, the Maintainance Weight Loss Inventory (MWLI) (Appendix A). This instrument addressed characteristics of sex, age, income level, marital status and degree of exercise. These demographics have been identified in previous research as factors relevant to

weight loss and maintenance.

Description of the Procedures

Permission was obtained to use human subjects in this study from the Oklahoma State University Institutional Review Board. Additionally, permission was given by physician-supervised clinics who indicated an interest in participating in the study. The clinics that participated in the study specialized in low-calorie or low-fat diets or liquid diet programs supervised by physicians. These programs utilized behavioral modification classes and nutrition education. Exercise was emphasized in the programs as facilitating weight loss and maintenance.

The researcher gave the clinics selection criteria for prospective subjects. Categorization was based on whether a subject had maintained or regained lost weight. Maintainers were subjects who had maintained a goal weight within 15% of an identified realistic body weight after completion of a diet regime for one year previous to this study. Regainers were subjects who had not maintained a goal weight and who had regained a portion or all of weight lost, one year after completion of a diet program previous to this study.

Physicians in each clinic were given this selection criteria for identification of eligible patients. These physicians chose from an existing caseload of patients who

would qualify as maintainers and regainers based on the researcher's definitions. Each clinic then contacted these patients by phone or in person to find out who would volunteer to participate in the study. Over 200 individuals were contacted; however, only 150 people agreed to participate. The researcher distributed 150 packets to clinic personnel containing the two assessment instruments, the 16 PF and the MWLI questionnaire. Full instructions (Appendix B) and expectations were verbally outlined by the researcher to a designated clinic employee. This same staff member was given the primary responsibility in explaining the procedures to the subjects. The packets were given to the subjects by the clinic staff members and briefed about procedures in the clinic office. Appointments had been set with the subjects by a phone call. All 150 packets were distributed by the clinics and returned to the clinics by the subjects. This process took approximately 6 weeks. Each briefing session required from 15-30 minutes in order to explain the contents of the packets, giving clear instructions, and answering any questions that were raised. Approximately 70% of the packets (100) were returned to the clinics. Clinic personnel made a follow-up phone call one week after the packets were distributed to insure faster delivery. Clinic personnel assigned numbers to the packets returned by the patients, who had been identified previously as maintainers or regainers by the physician. This was to insure their anonymity from the

researcher.

The researcher, after compiling data from the two instruments, utilized 80% of the packets returned. Those packets that could not be utilized in this study were eliminated due to subjects not responding to all of the questions on one or both of the instruments and/or faking good/faking bad on the 16 PF. Data were analyzed using the SPSS computer software package.

Statistical Analysis

The primary problem statements addressed in the treatment of the data: Was there a group of personality factors that could differentiate maintainers from regainers? Another question relevant to the study was: What were the characteristics of maintainers and regainers on demographics of age, sex, income level, marital status and degree of exercise?

Consequently, data were collected in order to calculate a discriminant analysis. This study extracted a linear composite that maximized the differences between regainers and maintainers. This discriminant analysis attempted to extract a linear composite from the 5 secondary factors comprising the 16 PF.

Demographic characteristics were presented based on a self-administered questionnaire in order to describe the variables of sex, age, income level, marital status, and degree of exercise for maintainers and regainers.

An alpha of .05 was set for rejection of the null hypothesis. Thus, with p = .05 for rejection of the null hypothesis, the chances are only 5 out of 100 (.05) that a difference as large (or larger) would occur just by chance as a result of sampling error (Gay, 1988). In this study committing a Type I error is less problematic than a Type II error. Concluding there is a difference when there really is not (Type II) would not be critical. Therefore, this study has been designed as a preliminary analysis of personality factors related to weight maintenance, therefore replication of results would be necessary. Furthermore, since maintenance research has been historically limited, additional research is warranted to support variables that improve treatment outcomes.

CHAPTER IV

RESULTS

Introduction

The results of the statistical analysis of the data pertaining to the hypothesis tested in this study are presented in this chapter. The purpose of this study was to determine if personality factors can be used to differentiate between those individuals who have been successful in maintaining lost weight versus those who have regained their previously lost weight. Maintainers were classified as subjects who had maintained a goal weight within 15% of an identified realistic body weight after completion of a diet regime for one year previous to this study. Regainers were subjects who had not maintained a goal weight and who had regained a portion of all weight lost, one year after completion of a diet program previous to this study.

Test of the Hypothesis

The null hypothesis states that groups of maintainers and regainers cannot be differentiated on the basis of personality factors as defined by a discriminant function. The personality factors of maintainers and regainers in this

study were assessed by the 16 PF. This instrument yields 16 personality scores which have been reduced to five secondary factor scores. Therefore, total scores on these five factors were used in this discriminant analysis. Scores on those five factors for both groups ranged from 1.6 to 9.8 on a scale from 1 to 10 as shown in Table 1.

Table 1

Means and Standard Deviations of Scores of Five Secondary Personality Factors of 16 PF

	Maintainers N=41		Regainers N=39	
	M	SD	M	SD
Extraversion	6.5	1.6	4.0	1.0
Anxiety	6.4	1.3	5.9	2.3
Tough Poise	6.3	1.0	4.7	1.7
Independence	7.2	1.5	4.0	1.4
Control	6.0	1.4	5.7	1.7

A discriminant analysis was calculated using the five secondary factors to determine if these factors would yield a linear composite that would discriminate between maintainers and regainers. The discriminant function extracted was found to significantly discriminate between maintainers and regainers. Given the two groups, the single function, Wilkes lambda of .403 (approximate Chi square = 68.629, df = 5, $p < .0001$) was significant. The cannonical correlation .773 indicated that approximately 60% of the

variance in the group classification is common to the discriminant function, therefore suggesting that the differences between the groups were too large to attribute to chance.

In order to interpret the nature of function extracted, comparisons revealed that three of the factors were significant in this linear composite. The first variable, independence, accounted for 73% of the variance in this function; extraversion accounted for 34% of the variance; and the third significant variable, tough poise, accounted for approximately 13% of the variance in this function as summarized by Table 2.

Table 2

Percentage of Variance Contributing to the Function

Discriminating Variables	Discriminant Function
Independence	.728*
Extraversion	.340*
Tough Poise	.126*
Anxiety	.068
Control	.008

* $p < .01$.

The correlations between the variables and the discriminant function were .945 for Independence, .765 for Extraversion, and .472 for Tough Poise as listed in Table 3.

Table 3

Correlation between Personality Factors and Discriminant Function

Discriminating Variables	Discriminant Function
Independence	.945
Extraversion	.765
Tough Poise	.472
Anxiety	.119
Control	.062

Multicollinearity may be present with independence (.945) accounting for most of the variance. A Pearson correlation matrix was calculated using the three factors that were significant in the discriminant function. Interpretation of these results confirmed the presence of multicollinearity. Independence, extraversion, and tough poise are strongly correlated as presented in Table 4.

Table 4

Pearson Correlation Matrix

	Independence	Extraversion	Tough Poise
Independence	1.000	.7734*	.5812*
Extraversion	.7734 *	1.000	.5241*
Tough Poise	.5812	.5241*	1.0000

*$p < .01$.

The classification of maintainers and regainers with the discriminant function was correct in 90% of the cases as presented in Table 5.

Table 5

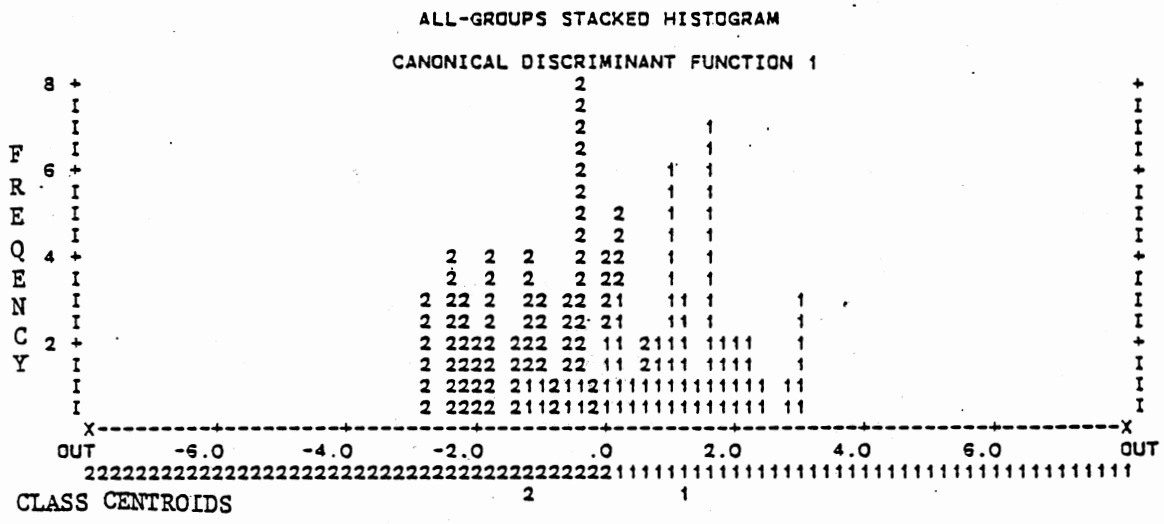
Classification of Maintainers vs. Regainers with Discriminant Function

Actual Group		Predicted Group Memberships: Maintainer	Regainer
Maintainers	41	37 (90%)	4 (10%)
Regainers	39	4 (10%)	35 (90%)

This was a high hit rate of accurate classifications with only 10% of the discriminating scores not correctly classified. Group centroids, as supported in Figure 1, indicated that scores that fall close to a mean of 1.17 on the discriminant function would be classified as maintainers. Discriminating scores falling near a mean of -1.23 on the function would be classified as regainers.

The linear composite extracted from the five personality factors was significant. Therefore, the null hypothesis was rejected. Approximately 60% of the variance in the group classification is common to the discriminant function.

Figure 1



Demographics

In terms of age, sex, marital status, and income level, maintainers and regainers exhibited similar characteristics as presented in Table 6. Characteristics of the maintainers and regainers that participated in the study are described using demographic variables of sex, age, marital status, level of income and degree of exercise. However, differences were indicated on the variable of exercise.

Table 6

Demographic Descriptive Data of the Sample

Demographics	Maintainers (N = 41)		Regainers (N = 39)	
	N	%	N	%
Sex				
Male	14	34%	14	36%
Female	27	66%	25	64%
Age				
20-30	5	12%	5	13%
31-40	20	49%	17	45%
41-50	9	22%	8	21%
51-60	4	10%	5	13%
60+	3	7%	4	8%
Mean age = 41 years Mode = 39 years				
Income (in thousands)				
10-20	9	22%	9	21%
21-30	21	51%	17	45%
31-40	7	17%	8	21%
40+	4	10%	5	13%
Marital Status				
Single	4	9%	4	10%
Married	32	79%	27	70%
Divorced	4	9%	6	15%
Widowed	1	3%	2	5%

Inspection of the data in Table 7 indicates that approximately 85% of maintainers exercised three or more times a week. Only 15% exercised less than three times a week.

Table 7

Exercise Frequencies: Times per Week by Group

	Times per Week								
	0	1	2	3	4	5	6	7	Totals
Group									
Maintainers	3	0	3	12	9	3	5	6	41
Regainers	13	4	16	5	1	0	0	0	39
Totals	16	4	19	17	10	3	5	6	80

Further inspection of tabulations revealed that approximately 33% of regainers did not participate in any exercise. Of those regainers who did exercise, approximately 51% exercised less than three times a week, with 16% exercising three times or more a week.

Cross-tabulations times per week by duration of exercise as presented in Tables 8 and 9 indicated differences between maintainers and regainers.

Table 8 revealed that approximately 85% of the maintainers exercised three or more times per week and the duration of each session was approximately 30 minutes or more for each workout period. Only 10% of regainers exercised three or more times per week and approximately 30 minutes or more per session, as shown in Table 9. Regainers did not exercise in 33% of the cases compared to only 7% of maintainers who did not exercise.

Table 8

Cross-Tabulation: Duration of Exercise X

No. of Times Per Week (Maintainers)

	Duration (Minutes)								
	0	15	20	30	40	50	60	90	120
Times per Week									
0	3								
1									
2							3		
3				1	1		7	2	1
4				3	1		4		1
5					1		2		
6					2	3	2		
7			2				1		1
Total	3		2	4	5	3	19	2	3 = 41

Table 9

Cross-Tabulation: Duration of Exercise X

No. of Times per Week (Regainers)

	Duration							
	0	15	20	30	40	50	60	180
Times per Week								
0	13							
1				1			1	2
2		1	4	4	1		6	
3			1	1			3	
4		1						
5								
6								
7								
Total	13	2	5	6	1		10	2 = 39

Summary of Results

A linear composite was extracted from the five secondary factors of the 16 PF. One discriminant function was extracted from the factors. The Wilkes lambda of .403 (approximate Chi square = 68.629, df = 5, $p < .0001$ indicated that the discriminant function extracted, was significant. Therefore, the null hypothesis was rejected, since the differences between the groups were too large to attribute to chance. The cannonical correlation .773 indicated that approximately 60% of the variance in the group classification is common to the discriminant function. Three of the five factors, independence, extraversion and tough poise, contribute significantly to the discriminant function. Additionally, group classification of maintainers and regainers was correct in 90% of the cases.

Multicollinearity may be present in this function with Independence accounting for most of variance in the groups. There were strong intercorrelations between three factors confirming the presence of multicollinearity. When independence was added to the equation, it accounted for .945 of the variance in the group on the function. Extraversion (.765) and tough poise (.472) accounted for additional variance, but not as much as independence. Anxiety and control did not significantly account for additional group classification. These variables may be inter-correlated with independence accounting for most of the variance in

the groups.

This study should be replicated which could result in shrinkage (Stevens, 1986) because discriminant analysis is a mathematical maximization procedure. Replication with a different sample may result in lower discrimination. This shrinkage may demonstrate less distinction between groups of maintainers and regainers. Discriminant analysis also capitalizes on chance, especially if the sample size is not large enough relative to the number of variables studied. However, in this study sample size was not a problem. A post hoc estimation of power was calculated. This study had an adequate sample size to support the results. Using Cohen's (1983) procedure, a large effect size was found. With five discriminant variables and two groups, this study had high power, greater than .99.

Result of a Box's M test indicated that assumptions of normality and variance were not met. However, these violations were not viewed as problematic in this case. According to Stevens (1986) this procedure is especially sensitive to non-normality which may be present. Furthermore, discriminant analysis is robust to violations of these assumptions.

No demographic differences were described for the variables of age, sex, marital status or income level. However, the degree of exercise reported, indicated maintainers in this study exercised more frequently and for a longer duration than regainers in the study.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents a general perspective of the study and an interpretation of the results. General conclusions drawn from these results are discussed and recommendations for future research in this area are provided.

Summary

The purpose of this study was to determine if personality attributes can be used to create a profile that distinguishes maintainers of weight loss from those who have regained lost weight. Furthermore, characteristics of maintainers and regainers were examined to identify any demographic differences between the groups used in this study.

Little emphasis is given to the dynamics of long-term weight loss and maintenance in previous research. Several areas of study may play a critical role in the determinants of sustained weight loss. Nutrition and genetics play an important role in the metabolic process of efficient physiological functioning. Specific hormonal disorders, deficiencies and diseases may predispose some people to obesity. Additionally this review identified the powerful

biological urge to maintain a current body weight through the stabilizations of the body's internal set point and fat cell quota. Furthermore, psychosocial distress creates tremendous pressures, unrealistic expectations and frustrations. Women tend to experience more psychosocial pressure to be thin, at the same time experiencing strong physiological pressures to be heavier.

Previous research indicates no significant differences in personality and behavioral dynamics of the obese compared to the non-obese. Other factors that are potentially related to long-term weight loss are reported in the literature. These include social support, exercise, behavior modification, matching patient to diet program, and low-fat diets. Unique personality differences were noted between those who lose weight and those who maintain weight. These results indicated a need to address the personality and demographic variables that may assist in designing a treatment program to match an individual's psychological profile.

Hypothesis

The null hypothesis of the study was:

H_o: Groups of maintainers and regainers cannot be differentiated on the basis of personality factors as defined by a discriminant function.

Review of Methods

Subjects in the study were obtained from diet programs, while under the supervision of physician-directed weight loss programs in a large Southwestern city. There was a total of 80 subjects, 52 females and 28 males, involved in the study. Subjects were classified into groups as regainers or maintainers depending on whether the individual had maintained a goal weight for a period of one year or whether that weight had been regained after one year previous to this study (41 regainers, 39 maintainers).

Data consisted of the subjects' scores on the 16 PF (IPAT, 1986) measuring 16 different personality characteristics. The five secondary factors of the 16 PF, independence, extraversion, anxiety, tough poise, and control, were used in the study, These secondary dimensions offered the most reliable and valid factors for use in identifying differences between maintainers and regainers based upon a linear composite.

In addition, demographic data were obtained by means of a self-administered questionnaire. Characteristics of maintainers and regainers were identified to describe the variables of sex, age, income level, marital status, and degree of exercise.

Discussion and Implications

This study considered the following research questions: was there a group of personality factors that could

differentiate maintainers from regainers? What were the characteristics of maintainers and regainers on demographics of age, sex, income level, marital status, and degree of exercise?

The analysis of the data collected relative to the first research question indicated that a discriminant function extracted from the five personality factors as measured by the 16 PF (IPAT, 1986) significantly differentiated between maintainers and regainers. Therefore the null hypothesis was rejected, indicating that the differences found were too large to be attributed to pure chance.

One variable, independence, appeared to account for most of the variance in the discriminant function. Multicollinearity was present between the three correlated variables of independence, extraversion, and tough poise. These three factors were significantly correlated with the function. The correct classification rate of groups in this study was 90%.

These results of a significant discriminant function extracted from the five secondary personality factors of the 16 PF support the use of psychological factors associated with long-term maintenance of weight loss. This information may assist in the further development of a personality profile that can be combined with a treatment program to insure compliance with weight loss maintenance.

Maintainers tended to be more independent, daring people seeking situations where initiative is rewarded.

Additionally, maintainers were more socially outgoing and competent at making and maintaining interpersonal contacts. They may be less group-dependent, needing less support from others, and more used to making decisions for themselves. Furthermore, maintainers tended to be bold, decisive and enterprising, basing their decisions on fact, not feelings. In contrast regainers were more group-dependent, passive types. They were likely to desire and need support from other persons and likely to orient their behaviors toward persons who give such support. Additionally regainers tended to be shy, and inhibited in interpersonal contacts. Furthermore, regainers tended to be strongly influenced by their emotions. They may be sensitive to their own feelings as well as to those of others. However, they may tend to be slow to take decisive action, preferring to give a problem much consideration.

These profiles are similar to variables in a study by Bolocofsky, et al. (1984) which identified maintainers as more independent, practical, self-reliant, and more objective. This research also identified regainers as more sensitive, dependent, more and trusting. Armillay (1985) also utilized the 16 PF to identify various personality factors relevant to weight loss. Armillay's study found Independence/Dependence as significantly related to appropriate treatment.

This study goes further in building on a group of traits that could possibly be used (the five secondary

factors) in classifying patients into potential regainers or maintainers. Successful classification could eventually be matched with a program based on further research that fit the patient's psychological orientation.

Because of increased knowledge regarding the dynamics of physiological pressure to regain lost weight, there is a strong need to understand the psychological dynamics of an individual who may overcome the powerful biological rebounding effect (Brownell, 1984).

Identification of a profile based on classification of maintainers and regainers utilizing a discriminant function of personality factors could be useful as a screening device in order to design a more individualized treatment method and program. Additionally, people who are at risk of regaining lost weight could benefit by early detection to avoid and prevent the relapse syndrome. Being able to combine a psychological profile using the three significant variables in the study as indicated with other discriminators (i.e. demographics) of potential successful weight maintenance could promote an internal feeling of control and satisfaction, thus increasing the chances of continued maintenance.

The analysis of the data collected relative to the second research question indicated that maintainers and regainers exhibited similar characteristics in terms of sex, age, marital status and income level. No demographic differences were described. However, differences were

indicated on the variable of exercise. This finding suggested that in this study the maintainers exercised more frequently than regainers.

This descriptive information validates previous research findings indicating maintainers and regainers have few differences in terms of demographic characteristics of age, sex, marital status and income level. Those who lose and keep it off are not much different than those who regain lost weight based on their gender, age, whether they are married or not, and how much money they earn. However, exercise has been identified in numerous research efforts as the critical link with not only successful short-term weight loss, but also with long-term maintenance of lost weight. (Brownell, 1984) From these findings, it appears that those who maintain weight tend to exercise more than those who regain lost weight. In other words, to keep weight off it seems necessary to establish a consistent exercise program. Understanding how an individual evaluates or responds to the benefits of exercise may be linked to the dynamics of the subject's personality.

The demographic characteristics of maintainers and regainers described in this study substantiated previous research efforts. Additionally, the importance of exercise to long-term weight maintenance appeared as a demographic characteristic of maintainers and regainers in this study.

Practical Implications

This study demonstrated a need for including the psychological dynamics of sustained weight loss maintenance in multi-disciplinary research efforts. The results of this study may assist in further research to develop a personality profile to assist in the design of more individualized treatment methods. Previously, there existed little information about a personality profile that could be combined with a treatment program to increase compliance with long-term maintenance of weight lost. Because of increased knowledge about the physiological pressure to regain lost weight, there is even a stronger need to understand the psychological ramifications. Research has identified powerful biological forces that influence weight loss maintenance factors. Therefore, it is important to evaluate why some individuals can maintain lost weight while others with similar genetic predispositions regain. Early identification and implementation of any kind of weight loss or maintenance program without attention to psychological issues could contribute to program failure, patient frustration and relapse.

Identification of a personality profile may assist in some kind of screening to design more individualized treatment methods, as well as early detection of those people at risk of regaining lost weight. Further research could combine this information with a weight loss program in order to classify a psychological profile of new weight

loss participants into potential regainers or maintainers. This classification would assist in designing a treatment program that would fit their "independent-dependent," "extraverted-introverted" characteristic style of interaction with others. Theoretically this might provide interventions by a multi-disciplined staff (i.e., physician, nutritionist, psychologist, trainer). For a more dependent, group-oriented personality type, a staff may have to provide a high level of direct contact for the patient over a longer period of time. These individuals may be more influenced by interacting with others who are going through the program. Group experience may prove to be more productive. These dynamics of a profile could assist in keeping a more dependent, sensitive person connected with a physician-supervised diet program.

Less direct intervention may be warranted for the more independent, extraverted personality style. This individual may not prefer a group-oriented program, but may respond to an individually designed, self-directed approach or treatment that involves direct personal involvement with the multi-disciplined team. Understanding the unique personality dynamics of a person who has had numerous diet attempts and failed may be crucial to the physician, nutritionist, psychologist, nurse, and trainer in providing a well balanced program, and ultimately providing long-term success for the patients.

Discussion of Problems and Limitations

One of the problems encountered in this study was being restricted to a small sample of regainers and maintainers. Ideally a larger sample across geographic locations would be necessary utilizing not only physician-assisted clinics, but larger hospital weight loss clinics and individuals who lose and regain weight without the help of a physician.

Additionally the research was a retrospective study utilizing predetermined criteria of weight maintenance established by the researcher. For replication of this study, it is suggested that participants be given the 16 PF before weight loss, to establish a base line profile to rule out the possibility that behavior or personality changed as a result of the weight maintenance factor. Furthermore, randomized assignment and selection were restricted due to the retrospective nature of the study, which looked at those who had already lost weight, maintained or regained. Random assignment and selection might better be controlled by getting a larger sample and by pre-testing/post-testing subjects who are beginning a diet, lose weight, and either regain or maintain over a one-year time period. Additionally participants might be randomly assigned to different diet programs. Random selection might be improved by selecting from not only private clinics, but from hospitals and university research centers across different geographical locations.

Obviously many variables could not be controlled for in this research. Variables that might be controlled for in future efforts include physiological, psychosocial, cultural and nutritional factors. Another critical limitation was an inability to evaluate the population at large. It is difficult to find an adequate number of weight loss maintainers. Additionally, finding subjects who diet, lose weight and either regain or maintain lose weight without physician assistance, are also difficult to find (Brownell, 1984).

In terms of statistical limitations, the following concerns warrant consideration. The discriminant function correctly classified 90% of the cases in this study. However, replication of this study would be warranted to validate these results. Furthermore, replication will probably result in shrinkage (Stevens, 1986), because discriminant analysis is a mathematical maximization procedure. Discriminant analysis extracts linear composites that maximize the differences between groups.

Tests of assumptions of homogeneity of variance were conducted with an examination of groups matrices using Box's M. Results indicated that the assumptions for homogeneity of variance were not met in this case (Stevens, 1986). However, discriminant analysis is robust to violations of this assumption because it is a mathematical maximization technique. Therefore, violation of homogeneity of variance is not viewed as problematic in this

interpretation.

Limitations in terms of the demographics can again be affected by the limited sample size and problems with using retrospective data analysis. Additionally the groups in this study, especially the maintainer group, may have been more exercise-oriented than most other weight loss groups. The programs involved for both groups stressed the importance of exercise and offered aerobics in the treatment program.

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, 226-33.

Abramson, E. E. (1977). Behavioral approaches to weight control. New York: Springer Publishing Company.

Allon, N. (1979). Self-perceptions of the stigma of overweight in relationship to weight-losing patterns. The American Journal of Clinical Nutrition, 32, 470-480.

Astrand, P. O., & Rodahl, T. (1977). Textbook of work physiology. New York: McGraw-Hill Book Co.

Armillay, J. A. (1985). Weight loss and personality in women: An exploratory study of relationships between success in weight loss and selected personality factors. Temple University, University Microfilm ADG 85-09305-8509 (Dissertation Abstracts Vol. 46.799).

Atkinson, R. M., & Ringuetti, E. L. (1967). A survey of biological and psychological features in extraordinary fatness. Psychosomatic Medicine, 29, 121-133.

Bandura, A. (1977). Self-efficiency: Toward a unifying theory behavioral change. Psychological Review, 84, 191-215.

Beller, A. S. (1977). Fat and thin: A natural history of obesity. New York: Farras, Straus & Giroux.

Bistrian, B. R. (1980). Prevalence, causes and therapy of obesity. In Steffie, W. P. (Ed.) Obesity: A Comprehensive Approach. Columbus: Ross Laboratories.

Bolocofsky, D. N., Coulthard-Morris, L., & Spinler, L. (1984). Prediction of successful weight management from personality and demographic data. Psychological Reports, 55, 795-802.

Bray, G. A. (1982). Obesity: Current Concepts. The Upjohn Co.

Brownell, K. D. (1982). Obesity: Understanding and treating a serious prevalent, and refractory disorder. Journal of Consulting and Clinical Psychology, 50(6), 820-840.

Brownell, K. D. (1984). The psychology and physiology of obesity: Implications for screening and treatment. Journal of Consulting and Clinical Psychology, 84(4), 406-414.

Brownell, K. D., Bachorik, P.S., & Ayerle, R. S. (1982). Changes in plasma lipid and lipoprotein levels in men and women after a program of moderate exercise. Circulation, 65, 477.

Brownell, K. D., Heckerman, Carol L., & Westlake, Robert S. (1979). The behavioral control of obesity: A descriptive analysis of a large-scale program. Journal of Clinical Psychology, 35(4), 864-69.

Brownell, D. K., & Kaye, F. S. (1982). A school-based behavior modification, nutrition education and physical activity program for obese children. The American Journal of Clinical Nutrition, 35, 277-83.

Brownell, K. D., & Stunkard, A. J. (1980). Physical activity in the development and control of obesity. In Stunkard, A. J. (Ed.) Obesity. Philadelphia: W. B. Saunders Co.

Brownell, K. D., & Wadden, T. A. (1983). Behavioral and self-help treatments. In Greenwood, M. R. C. (Ed.) Obesity. New York: Churchill Livingstone.

Brownell, K. D., & Wadden, T. A. (1986). Behavior therapy for obesity: Modern approaches and telling results. In Brownell, K. D. and Foreyt, J. P. (Eds.), Handbook of eating disorders. New York: Basic Books, Inc.

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

Buros, O. K. (Ed.). (1985). The Eighth Mental Measurement Yearbook, Volume 1. New Jersey: The Gryphon Press.

Butcher, J. N. (1985). The matching of behavior rating and questionnarie personality factors. Psychological Bulletin, 57, 201-212.

Canning, H., & Mayer, J. (1967). Obesity--its possible effect on college acceptance. American Journal of Clinical Nutrition, 20, 352.

Cattell, R. B., Eber, H. W., & Talsaoka, M. M. (1988). Handbook for the Sixteen Personality Factor Questionnaire (16 PF). Champaign: Institute for Personality and Ability Testing, Inc.

Clancy, J. (1965). Other aspects of depression. Geriatrics, 20, 92-98.

Cohen, J. & Cohen, P. (1983). Applied multiple regression/ correlation analysis for the behavioral science (2nd ed.). New Jersey: Erlbaum Publishers.

Edelman, B. (1982). Developmental differences in the conceptualization of obesity: A preliminary analysis of elementary school children's responses. Journal of American Dietetic Association, 80, 122.

Eysenck, H. J., White, P. O., & Soueif, M. I. (1969). Factors in the Cattell Personality Inventory. In H. J. Eysenck & S. B. G. Eysench (Eds)., Personality Structure and Measurement (1985). San Diego: Robert R. Knapp Publisher.

Folkins, C. H. & Sime, W. E. (1981). Physical fitness training and mental health. American Psychologist, 36: 373.

Foreyt, J. P., Mitchell, R. E., Garner D., T., Gee, M. L., Scott, L. W., & Gotto, A. M. (1982). Behavioral treatment of obesity: Results and limitations. Behavior Therapy, 13, 153-161.

Garrow, J. S. (1981). Treat obesity seriously: A clinical manual. New York: Churchill Livingstone.

Greenwood, M. R. C. (Ed.). (1983). Contemporary Issues in Clinical Nutrition: Obesity. New York: Churchill Livingstone.

Groer, M. E., & Shekleton, M. E. (1979). Basic pathophysiology. St. Louis: C. V. Mosby Co.

Gurin, J., Sallman, P., & Mothers, D. (1987). The California nutrition book. New York: Little, Brown and Company.

Gurin, J. (1989). Leaner not lighter. Psychology Today, June.

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

Held, J. O. & Snow, D. L. (1972). MMPI, internal-external control, and problem checklist scores of obese adolescent females. Journal of Clinical Psychology, 28, 523-25.

Holland, J. , Masling, J. & Copley, D. (1970). Mental illness in lower class normal, obese and hyperobese women. Psychosomatic Medicine, 32, 351-57.

Institute for Personality and Ability Testing [IPAT] Staff. (1986). Administrator's Manual for the 16 PF. Champaign: IPAT, Inc.

Jeffery, R. W., Gerber, W. M., Rosenthal, B.S., & Lindquist, R. A. (1983). Monetary contracts in weight control: Effectiveness of group and individual contracts of varying size. Journal of Consulting and Clinical Psychology, 51, 242-48.

Jeffery, R. W., & Stunkard, A. J. (1978). Behavioral treatment of obesity: The state of the art. Behavior Therapy, 9, 189-99.

Jeffery, R. W., Vender, M., & Wing, R. R. (1978). Weight loss and behavior change one year after behavioral treatment for obesity. Journal of Consulting and Clinical Psychology, 46, 368-69.

Johnson, S. F., Swenson, M. W., & Gastineau, C. F. (1976). Personality characteristics in obesity: Relation of MMPI profile and age of onset of obesity to success in weight reduction. The American Journal of Clinical Nutrition, 29, 626-32.

Kalchthaler, T. (1983). Aging and late life. In Taylor, R. B. (Ed.). Textbook of Family Medicine: Principles and Practice. New York: Springer-Verlag.

Keesey R. A. (1980). A set-point analysis of the regulation of body weight. In A. S. Stunkard (Ed.). Obesity. Philadelphia: Saunders.

Kelley, A. H. (1975). A comparison of learning-theory based approaches in the treatment of obesity. Dissertation Abstracts International, 36, 912B. (University Microfilms No. 75-17, 225).

Kincey, J. (1980). Target setting, self-reinforcement pattern and locus of control orientation as predictors of outcome in a behavioral weight-loss programme. Behavior Research and Therapy, 18, 139-145.

Kingsley, R. G., & Wilson, G. T. (1977). Behavior therapy for obesity: A comparative investigation of long-term efficacy. Journal of Consulting Clinical Psychology, 45, 288-89.

Krause, V., & Mahan, K. L. (1979). Food, nutrition and diet therapy (6th ed.). Philadelphia: W. B. Saunders Co.

Krug, S. E., & Johns, E. F. (1986). A large-scale cross validation of second-order personality structure defined by the 16 PF. Psychological Reports, 59, 683-93.

Lefley, H. P. (1971). Masculinity-femininity in obese women. Journal of Consulting and Clinical Psychology, 37, 180-86.

Leon, G. R. (1976). Current directions in the treatment of obesity, 83, 557-578.

Leon, G. R. (1982). Personality and behavioral correlations of obesity. Psychological aspects of obesity. New York: Van Nostrand Reinhold Co.

Leon, G. R., & Chamberlain, K. (1983). Emotional arousal, eating patterns, and body image associated with differential factors associated with varying success in maintaining weight loss. Journal of Consulting Clinical Psychology, 40, 474-80.

Levitt, H., & Fellner, C. (1965). MMPI Profiles of three obese subgroups. Journal of Consulting Psychology, 29, 11-16.

Maddox, G. L., Back, K. W., & Liederman, V. R. (1968). Overweight as social deviance and disability. Journal of Health and Social Behavior, 9, 287.

Mahoney, M. J., & Mahoney, K. (1976). Permanent weight control: A total solution to the dieter's dilemma. New York: W. W. Norton & Co.

Marston, A. R. & Criss, J. (1984). Maintenance of successful weight loss: Incidence and prediction. International Journal of Obesity, 8, 435-39.

McArdle, W. D., Katch, F. I., & Katch, V. L. (1981). Exercise Physiology: Energy, Nutrition, and Human Performance. Philadelphia: Lea & Febiger.

McBride, G. T. (1982). Obesity and women. Proceedings of the National Symposium on Obesity. Baltimore, Maryland, 8, 431-492.

Metropolitan Insurance Co. (1983). Metropolitan height and weight tables. New York: Author.

Paulsen, B. K. (1988). Lifesteps: Weight management program--a response from behavioral perspective. American Dietetic Journal, 95, 33-35.

Peterson, D. R. (1965). Scope and generality of verbally defined personality factors. Psychological Review, 1969, 48-59.

Pomerantz, A. S., Greenberg, B., & Blackburn, G. L. (1977). MMPI profiles of obese men and women. Psychological Reports, 41, 731-34.

Rabin, J. B. (1971). The treatment of obesity: Application of feedback principles. University of Louisville, Kentucky.

Richardson, S. A., Hastorf, A. H., Goodman, H., & Dornbusch, S. M. (1961). Cultural uniformity in reaction to physical disabilities. American Social Reviews, 26, 241.

Rickarby, G. A. (1981). Psychosocial dynamics in obesity. The Medical Journal of Australia, 2, 602-605.

Rodin, J. (1979). Pathogenesis of obesity; energy intake and expenditure. In Bray, G. A. (Ed.)., Obesity in America. PAEW Pub. No. (NIH) 79-359.

Schachter, S., & Rodin, J. (1974). Obese humans and rats. Washington, D.C.: Erlbaum/Halsted.

Schneider, H. A. (Ed.). (1977). Nutritional support of medical practice. New York: Harper & Row.

Scheuer, J., & Tipton, C. M. (1977). Cardiovascular adaptions to physical training. Annual Review of Physiology, 39, 221.

Silverstone, J. T. (1968). Obesity. Proceedings of the royal society of medicine, 61, 371-75.

Simonson, J. (1982). An overview: Advances in research and treatment of obesity. Food and Nutrition Reviews, March/April.

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

Stern, J. S. (1983). Diet and exercise. In Greenwood, M. R. C. (Ed.). Obesity. New York: Churchill Livingstone.

Stevens, James (1986). Applied multivariate statistics for the social sciences. Hillsdale, N.J.: Lawrence Erlbaum Assoc.

Stuart, R. B., & Guire, K. (1978). Some correlates of the maintenance of weight lost through behavior modifications. International Journal of Obesity, 2, 225-35.

Stunkard, A. J. (1976). The pain of obesity. Palo Alto: Bull Publishing Co.

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

Tucker, D. N. (1980). Study of weight and size discrimination. Baltimore: Report of the State of Maryland Commissioner on Human Relations.

Van Itallie, T. B. (1979). Obesity: Adverse effects on health and longevity. American Journal of Clinical Nutrition, 32, 2723-33.

Werkman, S. L. & Greenberg, E. S. (1967). Personality and interest patterns in obese adolescent girls. Psychosomatic Medicine, 29, 78-80.

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

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

Wooley, S. C., Wooley, O. W., & Dyrenfnorth, S. R. (1979). Theoretical, practical and social issues in behavioral treatments of obesity. Journal of Applied Behavior Analysis, 12, 3-25.

Zuckerman, M. (1985). Traits, states, situations, and uncertainty. Journal of Behavioral Assessment, 5, 43-54.

APPENDIX A

MAINTENANCE WEIGHT LOSS INVENTORY (MWLI)

Maintenance Weight Loss Inventory (MWLI)

Questionnaire

1. Name (number) _____ Date:_____

2. Age:_____ Sex: Male_____ Female_____

3. What is your present marital status? (check one)
   Married_____
   Single_____
   Separated_____
   Divorced_____
   Widowed_____

4. How many children do you have? _____

5. How many siblings (brothers/sisters) do you have? _____

6. What is the highest educational level you attained: (check one)
   High School_____
   Trade or professional school_____
   Some college_____
   College graduate_____
   Graduate education_____

7. What is your occupation? _____

8. What is your present annual income?_____

9. Has your annual or monthly income changed? _____(Yes/No). If so, what was the highest and lowest annual income during the last five years?_____

10. Has anyone in your immediate family had weight problems? If so, indicate by a check who in the list below has had weight problems.

    Mother_____
    Father_____
    Sibling(s)_____ (Number experiencing weight problems?_____)
    Spouse_____
    Child(ren)_____ (Number experiencing weight problems?_____)

11. How many diets have you been on in the last 10 years?_____

12. What do you weigh now?_____ lbs.

13. What did you weigh prior to your most recent diet attempt? ___ lbs.

14. How much have you lost on your most recent diet?_____ lbs.

15. If you lost weight, have you been able to keep the weight off? (within five pounds) ____ (Yes/No)

16. If you have regained lost pounds, how many pounds have you regained?
    ____ lbs.
    ____ all

17. How long did it take you to regain this weight?
    _____ (days, months or years)

18. If you have maintained lost weight, pounds, how long have you kept this weight off? (within five pounds)

    _____ 0-7 mos
    _____ 8-11 mos.
    _____ 1 yr.
    _____ if over one year, how long_____

18. Do you get regular exercise?
    _____ Yes
    _____ No

19. How often do you exercise?
    _____ 1-2 times per week
    _____ 3-5 times per week
    _____ 6 or more times per week

20. How much time, on the average, is spent each day on exercise?
    _____ 30 min. or less
    _____ 30-60 min.
    _____ 1-2 hours
    _____ More than 2 hours

Thank you.

APPENDIX B

INSTRUCTIONS FOR PARTICIPANTS

Instructions for Participants

March 1990

You have been selected to participate in a research project on dieting and weight loss. Enclosed is a packet with two different questionnaires to be filled out.

You are being asked to respond to questions on a paper and pencil instrument entitled the 16 PF and a demographic questionnaire. Each form is self-explanatory. Please fill out each questionnaire completely. Do not leave blank spaces. It will take about one hour to complete both forms. Do not put your name on either form. Please enter your number assigned to you by your physician/clinic.

To insure your anonymity you have been assigned a research number by your physician or clinic staff. The researcher will never know your identity or other personal information that could be identified with you.

After you have completed the two questionnaires, return to your physician or clinic. The clinic will double-check to insure your name is not on any of the research materials. The materials will then be turned over to the researcher for analysis.

Your participation in this project is very important. Please feel free to contact the clinic if you would like more information. Thank you for your participation.

VITA

Toni England

Candidate for the Degree of

Doctor of Philosophy

Thesis: MAINTENANCE OF WEIGHT LOSS: PERSONALITY FACTORS AND DEMOGRAPHIC CHARACTERISTICS

Major Field: Applied Behavioral Studies

Biographical:

Personal Data: Born in Tulsa, Oklahoma July 10, 1946, the daughter of Anthony H. and Alma Moeller.

Education: Graduated from Central Senior High School, Tulsa, Oklahoma, in May 1963; received Bachelor of Science Degree in Communication from University of Tulsa, Tulsa, Oklahoma, May 1967; Master of Science Degree at Oklahoma State University July, 1986; completed requirements for Doctor of Philosophy Degree at Oklahoma State University in July, 1991.

Professional Experience: Licensed Professional Counselor, Youth Services of Tulsa County, Marriage and Family Therapist, Private Clinics; Teaching Assistant, Applied Behavioral Studies Department, Oklahoma State University; Part-time Faculty, Tulsa Junior College, Tulsa, Oklahoma.