

Copyright by
ROBERT BRUCE WILEY
1979

FAMILY SYSTEM FACTORS IN

CHILDHOOD OBESITY

by

ROBERT BRUCE WILEY, B.A., M.A.

A DISSERTATION

IN

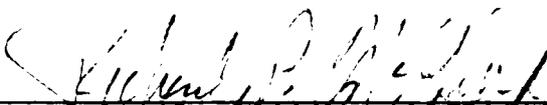
PSYCHOLOGY

Submitted to the Graduate Faculty
of Texas Tech University in
Partial Fulfillment of
the Requirements for
the Degree of

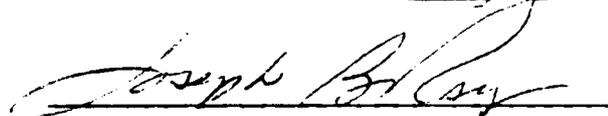
DOCTOR OF PHILOSOPHY

Approved

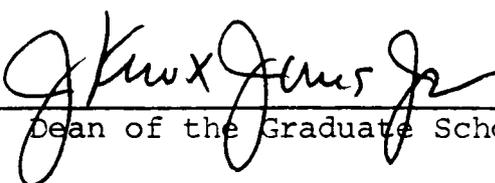
Chairman b^ the Committee







Accepted



Dean of the Graduate School

May, 1979

/ ^

IS

ltb0.37'

jt'i:

ACKNOWLEDGEMENTS

I would like to express special appreciation for the assistance, encouragement and patience extended by Dr. Bill Locke during my work on this dissertation. I would also like to thank my other committee members. Dr. Charles Halcomb, Dr. Joseph Ray, Dr. Richard McGlynn and Dr. James Clopton, for their helpful criticism and cooperation.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS. ii

LIST OF TABLES. V

LIST OF ILLUSTRATIONS. vii

I. INTRODUCTION. 1

 Characteristics of the Obese. 2

 Treatment of Obesity. 38

 Current Research Needs. 95

 The Present Investigation 98

II. METHOD. 102

 Variable Definitions. 102

 Variable Measures. 105

 Statistical Hypotheses and Tests. 113

 Subjects. 119

 Procedure. 121

III. RESULTS. 126

 Group Comparisons. 125

 Prediction of Dependent Variables. 149

 Factor Analysis. 160

 Interrater Reliabilities. 167

IV-	DISCUSSION	168
	Validity of Minuchin's Model.	169
	Dependent Variable Predictors.	173
	Generality of Results.	174
	New Treatment Approaches.	177
	Planned Research	179
	Summary.	180
	REFERENCES.	185
	APPENDIXES.	197
	I- Family Task	198
	II. Structured Family Interview.	199
	III. EF Group Raw Data.	200
	IV. CF Group Raw Data.	201

LIST OF TABLES

1.	Hypothesized FES-S Differences. . . . .	.115
2.	Hypothesized FES-E Differences. . . . .	.116
3.	Hypothesized BT Differences. . . . .	.117
4.	Measure Abbreviations and Values. . . . .	.127
5.	Matching Variables Group Comparisons. . . . .	.129
6.	FES-S Group Comparisons. . . . .	.131
7.	FES-E Group Comparisons. . . . .	.132
8.	BT Group Comparisons. . . . .	.133
9.	Correlations Between Corresponding FES-S and FES-E Measures. . . . .	.139
10.	Discriminant Analysis Summary: Best Combination of FES-S Variable Measures. . . . .	.141
11.	Standardized Discriminant Function Coefficients: Best Combination of FES-S Variable Measures. . . . .	.142
12.	Discriminant Analysis Summary: Best Combination of FES-E Variable Measures. . . . .	.143
13.	Standardized Discriminant Function Coefficients: Best Combination of FES-E Variable Measures. . . . .	.144
14.	Discriminant Analysis Summary: Best Combination of BT Variable Measures. . . . .	.145
15.	Standardized Discriminant Function Coefficients: Best Combination of BT Variable Measures. . . . .	.146
16.	Discriminant Analysis Summary: Best Combination of All Variable Measures. . . . .	.147
17.	Standardized Discriminant Function Coefficients: Best Combination of All Variable Measures. . . . .	.148

18.	Simple Correlations Between FES-S Measures and Dependent Variable Measures. . . . .	.151
19.	Simple Correlations Between FES-E Measures and Dependent Variable Measures. . . . .	.152
20.	Simple Correlations Between BT Measures and Dependent Variable Measures. . . . .	.153
21.	Stepwise Multiple Regression Analysis Summary: % Overweight . . . . .	.155
22.	Stepwise Multiple Regression Analysis Summary: # Sessions . . . . .	.156
23.	Stepwise Multiple Regression Analysis Summary: Lb. Lost. . . . .	.157
24-	Dependent Variable Intercorrelations. . . . .	.159
25.	Unrotated Factor Matrix . . . . .	.151
26.	Unrotated Factor Matrix: Variance Estimates. . . . .	.162
27.	Rotated Factor Matrix . . . . .	.163
28.	Rotated Factor Matrix: Bipolar Rearrangement. . . . .	.164

LIST OF ILLUSTRATIONS

Figure

1. FES-S Group Profiles. . . . .	.135
2. FES-E Group Profiles. . . . .	.136
3. BT Group Profiles. . . . .	.137

CHAPTER I

INTRODUCTION

The gross physical signs of the obese person's unique disturbance seem fairly obvious to most who observe him. Unfortunately, a genuine understanding of the causally significant factors in the etiology and maintenance of obesity and a functional grasp of demonstrably effective therapeutic procedures for this malady generally elude both laymen and professionals. Two attitudes most commonly held are that the obese person simply fails to exert "self-control" and that, to lose weight effectively and keep it off, he need only follow "a good doctor's advice." The facts that there are between 40 and 80 million obese persons in the U.S. alone (Stuart and Davis, 1972a) and that most of them have often tried but failed to follow "a good doctor's advice" (Stunkard, 1958) attest to the near-delusional quality of such beliefs.

Although hundreds of books and papers have been published preferring ideas, hypotheses and research findings concerning obesity, few systematic attempts have been made to critically evaluate this material in an effort to delineate what is known and determine in what areas further investigation should be conducted. It is the purpose of this dissertation to accomplish this task and to present an empirical study which is based on a thorough assessment of the present need for knowledge concerning the causes and treatment of obesity.

The present chapter provides a representative summary of the empirical literature on the nature and treatment of obesity. At the most general level, what follows is organized into four major sections: (a) the characteristics of the obese, (b) the treatment of obesity, (c) current research needs and (d) the present investigation. In the first section, findings concerning relevant social, physiological, psychological, behavioral and familial factors are summarized. In the second, findings concerning traditional medical treatment, contemporary "nonbehavioral" treatments and behavioral treatments are reviewed. The third section includes a discussion of the primary research needs in further developing an empirically based and clinically powerful understanding of obesity. The fourth section introduces the present empirical investigation and relates it to salient aspects of the previous sections.

Characteristics of the Obese

The research findings concerning the social, physiological, psychological, behavioral and familial characteristics of obese persons are important because, upon careful interpretation, they provide an explanatory and predictive rationale for why many existing therapeutic techniques have proven ineffective and which untried procedures are likely to generate unsatisfactory results. In the final major section of this chapter and in Chapter IV, comments are made concerning the relevance of the basic findings summarized in this section and the empirical results reported thus far concerning the clinical treatment of obesity-

Social Factors

In their review of the relevant portions of the Midtown Manhattan Study, Penick and Stunkard (1970) noted that there appears to be an inverse relationship between socioeconomic status and the prevalence of obesity and that this relationship is especially strong for women. Briefly, the study cited showed the prevalence of obesity among women to be about 30% in the lower socioeconomic segment of the population, about 16% in the middle segment and about 5% in the upper segment. Similar, but less distinctive results were shown to characterize men in the three socioeconomic levels. These findings have been corroborated by both Hinkle (1968) and Silverstone, Gordon and Stunkard (1969), among other investigators.

In their review of several survey-type studies, Dwyer, Feldman and Mayer (1970) pointed to evidence indicating that there are age and sex differences both in the prevalence of obesity and in the concern shown about weight problems. It is clear that more adults are obese than either children or adolescents and that obese men become significantly overweight earlier in adulthood (20's to 30's) than obese women (40's to 50's). A greater proportion of adolescents than adults actually attempt weight control and adolescents generally exhibit greater concern for such problems. Finally, these patterns are more prominent at all age levels among females than males.

Physiological Factors

Most accounts of obesity phenomena point up the obvious fact that two factors are operating: excessive caloric intake and insufficient

energy expenditure. While this uncomplicated description indicates the basic mechanism of fat loss, it hardly does justice to the less obvious physiological factors which may be related to the maintenance of an appropriate energy balance.

Attribution of fault to a variety of vaguely-defined metabolic disturbances (e.g., "thyroid problems") has long served absolution for many of the obese. Unfortunately, the evidence seems clear that unambiguously identifiable metabolic disturbances are rarely involved in the etiology of obesity, and, when such disturbances are present, their involvement is most commonly consequential rather than causal (Forbes, 1967). However, two physiological/metabolic facts have recently emerged which have significant bearing on the development and maintenance of obesity (Hirsch, Knittle and Salans, 1966; Knittle and Hirsch, 1968; and, Salans, Knittle and Hirsch, 1968). First, many obese persons appear to have a larger than normal number of adipose tissue cells (the hypercellular obese). Second, adipose cell deposits are established early in childhood and appear to remain largely unchanged, in terms of cell number, throughout life. With the presence of hypercellularity, obesity results and is maintained even when adipose cells merely achieve normal cell volume. Obesity can also result in normal-cellular persons, if adipose cell volume is significantly expanded, and progressively massive obesity occurs in the hypercellular individual as adipose cell volume increases above normal limits. The research finding of importance, in this

regard, is that enlarged adipose cells demonstrate a peculiar immunity to the effects of adrenaline and, consequently, show a reduced capacity to metabolize carbohydrates. These facts imply that one class of obese persons, hypercellular massively obese persons, probably experience considerably greater difficulty in achieving significant weight loss and maintenance than other obese persons.

Other physiological mechanisms involved in the control of satiety, which may have etiological significance, have been identified or inferred (Grossman, 1960; and Schachter, 1971). Specifically, it has been shown that most obese persons fail to report subjective experiences of hunger and satiety, as do normal-weight persons (Stunkard, 1959). Based largely on research done with hypothalamic-lesioned rats (rats having bilateral lesions in the ventromedial nucleus of the hypothalamus) and on analogical parallels between such rats and obese humans (Schachter, 1971), at least one theory has been advanced to the effect that obese humans may suffer from a hypothalamic dysfunction. One implication of this theory is that obese persons may suffer from an impairment in the "appetite" function of certain hypothalamic regions. This theory is discussed further in the subsequent section concerning Schachter's (1971) hypotheses.

Finally, on the basis of data from experimental work concerning the influence of genetic factors on the development of body fat in laboratory animals, it is reasonably assumed (that genetic transmission must have something to do with the development of obesity in humans). Although the nature and extent of such influence is not known, data have been generated showing that the risk of obesity in

children is 40% to 80% with one or both parents being obese, and only 9% with neither being obese (Johnson, Burke and Mayer, 1956). Despite obvious problems in interpretation, the assumption of genetic influence remains plausible. Empirical investigations which provide control over confounding environmental factors would do much to clarify the role of genetic influence.

Psychological Factors

Stuart and Davis (1972a) reviewed the literature concerning psychological characteristics associated with obesity- A direct review of most of this literature is not provided here for two reasons. First, the bulk of this literature is largely speculative and based on psychoanalytically oriented clinical impressions rather than on systematic empirical research. Second, several of the conclusions drawn by Stuart and Davis seem reasonably preemptive, in this context. These authors pointed out that: (a) it has been generally impossible to validate the various psychodynamic "theories" of obesity; (b) it has not been generally possible to consistently differentiate obese persons from nonobese persons on the basis of such formulations; (c) predictions from the psychodynamic hypotheses have not been validated in the research (especially those concerning the inevitability of symptom substitution or decompensation in the event of direct treatment of obesity-generating eating patterns); (d) emotional disturbances observed in some obese persons can be understood better as consequences of obesity and attempts at weight reduction, rather than as causes; and, (e) psychodynamic assumptions have been proven

unnecessary in devising the more effective of treatment regimens now available.

While the first three of these conclusions appear to represent the actual state of most psychodynamic formulations, the latter two are vulnerable to counter criticisms. Specifically, the assumption that emotional disturbance can be regarded as a consequence, rather than a cause, has no more empirical validation than the converse assumption. The observation that psychodynamic assumptions have proven unnecessary in devising effective treatment techniques may be similarly doctrinaire. As discussed in a later section, this observation may be partially accurate only with reference to the short-term results obtained in treating adequately functioning, moderately obese persons. With reference to long-term results, even in these cases, it appears invalid.

The foregoing qualifications notwithstanding, the bulk of psychodynamic formulations are generally vague, inconsistent or not empirical. A representative sample of the literature reviewed by Stuart and Davis (1972a) illustrates this point readily. For example, they cited Mendelson's (1966) categorization of obese persons along a continuum of emotional disturbance. According to this schema, the least disturbed are those who eat in response to emotional tensions and situational stress, while the most disturbed are those who are "addicted" to food. In between these extremes, from least disturbed to most, are those who eat as substitute gratification and those who eat to defend against emotional upheaval. Stuart and Davis pointed out that this schema has no systematic empirical validation. They

also cited a sample of writers who have provided speculative analyses more directly within the psychoanalytic frame-of-reference (e.g., Deri, 1955; Bychowski, 1950; and Kaplan and Kaplan, 1957). As Stuart and Davis pointed out, these psychoanalytic explanations of obesity encompass appeals to very diverse impulses, fixations, conflicts and other psychodynamic constructs. For example, it has been suggested both that obesity is a result of unresolved conflict and fixation in the oral stage of psychosexual development and that it is a result of such factors in the anal stage. More interestingly, perhaps, obesity has been interpreted as a symbolic manifestation of both a wish to incorporate the mother's breast and a desire to possess the father's penis, of both the acquisition of libido and the sadistic incorporation of the mother, of both the rejection of femininity and a protection against castration, and of both self-indulgence and self-punishment. Again, the impression one soon develops is that this literature embodies considerable confusion and conflicting conceptualization. Unfortunately, as is true of a large portion of psychoanalytic literature, virtually no acceptably controlled empirical studies have appeared, in this body of publications, that have done anything significant to alleviate the confusion or resolve the conflicting claims.

Bruch's (1973) analysis of psychological factors in obesity appears to be one modest exception to the foregoing conclusion. Bruch's research concerning various factors in obesity was not generally quantitative or experimental, but it was systematically observational. It involved a meticulous comparison of hundreds of clinical case studies over a period of more than forty years. For this reason and because

many of Bruch's conclusions have been reflected in the findings of subsequent experimental investigations, several of her primary hypotheses are summarized below.

In terms of the general adequacy of their psychological adaptation, Bruch (1973) subdivided obese persons into three main groups. The first group includes those obese persons whose excess weight is primarily related to constitutional make-up and/or a mild energy imbalance typical of many modern, relatively sedentary lifestyles. These persons are considered most likely to respond positively to dietary management without psychotherapy or behavior therapy. The second group includes persons whose overweight is labeled reactive obesity. This implies that obesity, for these persons, develops in response to some emotional trauma. In this reaction, which occurs most commonly in adults, the overeating functions to ward off unpleasant emotional states such as anxiety and depression. Bruch stated that persons in this group are usually aware of the defensive or compensatory nature of their overeating, but tend to feel less satisfied or effective when they attempt to control their food intake. For this reason, these persons tend to be refractory to weight loss through dietary management. Bruch considered them to be good candidates for psychotherapy, however, and reported case histories in which good weight loss occurred after the underlying emotional problems were resolved.

The third group includes persons suffering from what is termed developmental obesity. These are persons for whom the obesity is complexly interwoven with the whole psycho-social development

and are generally characterized by significant personality disturbance. The onset of developmental obesity is early in childhood. The degree of obesity reached is typically more severe than that reached by the other two groups. Bruch described the fundamental psychological disturbance in the developmentally obese as involving two related aspects: (a) lack of inner differentiation and (b) a corresponding deficit in the sense of being individuated in one's social environment. The lack of inner differentiation refers to an inability to discriminate inner feelings or states of sensation. The primary manifestation is that "hunger" is not differentiated from "satiating." These, in turn, are not differentiated from other feeling states that have nothing to do with food intake or deprivation. A primary consequence is that eating becomes conditioned to a variety of subjective states, including various types of emotional arousal. The deficit in the sense of being individuated in one's social environment involves a lack of awareness of being in control of one's actions. The developmentally obese "experience themselves as not being in control of their behavior, needs, and impulses, as not owning their own bodies, as not having a center of gravity within themselves. Instead, they feel under the influence and direction of external forces. They act as if their body and behavior were the product of other people's influences and actions" (Bruch, 1973, p. 55). A primary consequence of this lack of individuation is that eating becomes conditioned to a variety of environmental cues that have nothing to do with inner conditions of nutritional need.

Bruch (1973) elaborated her observations concerning the central deficits in inner differentiation and social individuation with regard to various disturbances in body concept: (a) disturbances in size awareness, (b) misperception of bodily functions, (c) misperception of sexual role, (d) disturbances in affective and social aspects of body awareness, and (e) disturbances in the sense of ownership and control of the body- Briefly, she observed that the developmentally obese (a) view their bodies as either not abnormally fat or as grotesquely fat and often fail to modify this view with weight loss, (b) often experience their immense body size as a source of security and protection from external harm, (c) are frequently confused about their gender identity and often experience a desire to be opposite sex or a combination of both, (d) experience intense hatred and loathing for what they regard as their ugly body and contemptible self, and (e) experience their body as being owned and controlled by other persons or external forces.

Bruch observed that the central components of the psychological disturbance characteristic of developmental obesity are primarily products of a disturbed interactional pattern between the mother and infant. Beginning with the infant's earliest expressions of nutritional need and the mother's response to them, there continues a relative lack of appropriate and confirming responses from the mother to signals from the infant indicating needs and other forms of self-experience. The most frequent expression of this lack of appropriate responses to the infant's signals is a superimposition of the mother's concept of the child's needs regardless of the child's behavior. When

these aspects of insensitivity and superimposition of maternal concepts are central in the mother-child relationship over a period of years, the child develops with significant deficits or disturbances in self-awareness and self-effectiveness. These and other related aspects of the family frame of the developmentally obese person are discussed further in a subsequent section.

Published reports have appeared showing empirical evidence of Bruch's observation of body image disturbances in severe obesity. The dimensions of body image studied include the accuracy of body size perception, the evaluation of the aesthetic properties of one's body and the social significance attributed to one's body size, shape and attractiveness.

Stunkard and Mendelson (1967) examined the incidence and nature of body image disturbances in a randomly selected sample of obesity cases. The sample consisted of half men and half women drawn from lower and middle socioeconomic groups of medical and psychiatric patients. Stunkard and Mendelson discovered that body image disturbances do not occur in the "emotionally healthy" obese and do occur in only a minority of the "neurotic" obese.

The body image disturbances that did appear seemed to emphasize affective factors rather than cognitive factors. The investigators noted that these disturbances resembled those reported by persons suffering from deformities of the face, breasts and genitals. Specifically, the obese person suffering from a body image disturbance (a) regards his obesity (body size) as his central, prepotent personal trait; (b) considers his own body as grotesque and loathsome;

and (c) feels that others invariably perceive him in terms of his horrible and contemptible physical state. One significant manifestation of the latter quality is the great difficulty such persons may have in relating to the opposite sex. Their responses to persons of the opposite sex may range from social inhibition and avoidance to "hateful devaluation" of opposite sex persons. Stunkard and Mendelson pointed out that, despite short-term fluctuations in intensity, these body image disturbances remain remarkably stable over long periods of time and in the face of significant changes in life circumstances. A therapeutically important finding was that these disturbances do not dissipate or disappear even with drastic weight loss and do not appear to remit spontaneously, although long-term psychotherapy has been known to effect positive change in some instances.

Stunkard and Mendelson noted that three factors seem to predispose obese persons to develop body image disturbances: (a) onset of obesity during childhood or adolescence, (b) the appearance of significant emotional disturbance, and (c) negative evaluation of one's obesity, during childhood or adolescence, by significant others. They indicated that adolescence is a high-risk period for development of body image disturbances among the obese. Apparently, if the obese person "escapes" into adulthood without such a disturbance, it is quite unlikely to appear in later years.

Glucksman and Hirsch (1969) reported an investigation of one aspect of the body image disturbance appearing in some obese persons—distortions in their perception of body size. Using two measures of

body size estimation, an adjustable body-distorting mirror and human figure drawings, they compared the body size estimates of six childhood onset, severely obese persons, all on weight reduction regimens, to those of nonobese controls. The findings were that the obese subjects increasingly overestimated their own body size during and following weight loss. These subjects also showed consistent overestimation of the size of other stimulus objects. In comparison, the nonobese subjects consistently underestimated their own body size and showed no uniform trend in their estimation of the size of other objects. The conclusion was that obese persons showing body image disturbances perceive themselves, following weight loss, as if no weight loss had actually occurred. This finding has been corroborated in studies by Stunkard and Burt (1967) and Sohlkhah (1967).

Behavioral Factors

A number of studies have been completed, during the past 15 years, concerning what may be broadly termed the unique behavioral characteristics of obese persons. The essence of the findings in this body of research was stated succinctly by Schachter (1971): "Eating by the obese person seems unrelated to any internal, visceral state, but is determined by external food-relevant cues such as sight, smell, and taste of food " (p. 130). This represents a firm, but independent corroboration of some of Bruch's primary psychological hypotheses. What follows is a selected review of the empirical literature related to this conclusion and, finally, a brief statement and discussion of Schachter's (1971) hypotheses about the behavioral-physiological nature

of obesity in humans. The topical organization of the material in this subsection generally follows that used by Stuart and Davis (1972a).

Gastric Motility

Evidence concerning the role of gastric motility in the subjective report of hunger in obese persons comes from studies conducted by Stunkard and his research associates (Stunkard, 1959; Stunkard and Koch, 1964). Using an apparatus involving a swallowed gastric balloon, these investigators found that obese subjects, in comparison to non-obese subjects, were significantly less likely to report hunger in association with gastric contractions.

Preloading

Further evidence concerning possible effects of internal physiological conditions on the eating behavior of the obese comes from studies involving preloading the stomach before consumption tests are made. Schachter, Goldman and Gordon (1968) compared the consumption of crackers in obese vs. nonobese subjects in two conditions: preloading with roast beef sandwiches and no preloading (overnight fasting). As predicted, they found that, while nonobese subjects ate far fewer crackers when preloaded, obese subjects ate slightly more crackers when preloaded than when not. The investigators concluded that the physiological state of the stomach has nothing to do with either reported hunger or eating behavior in the obese.

Evidence that serves to modify the foregoing conclusion was generated by the work of Pliner (1970). Briefly, Pliner found that obese humans, like hypothalamic-lesioned rats, do regulate their food

consumption when preloaded with liquid, although they do not so regulate when preloaded with solid food. Schachter (1971) cited this finding in support of his now-famous hypotheses about behavioral similarities between obese humans and hyperphagic rats.

Elapsed Time

Data demonstrating a differential consumption response, between obese and nonobese persons, to apparent time lapse are relevant to two points: the claim that obese persons are relatively impervious to internal consumption-related cues and that they are overresponsive to external cues. In this regard, Schachter and Gross (1968) conducted a study in which apparent time lapse was dichotomously manipulated using fast-running and slow-running clocks. Their finding was that obese subjects' consumption of "Wheat Thins" was influenced by perceived time lapse in a manner much different than was that of nonobese subjects. Obese subjects consumed significantly less on slow time but significantly more on fast time than nonobese subjects. The apparent implications are that obese persons respond strongly with consumption when they perceive meal time to be present or past, but not prior to perceived meal time. On the other hand, nonobese subjects seem to eat when hungry, even prior to perceived meal time, but tend to consume less when meal time appears to have passed.

In a naturalistic study, Goldman, Jaffa and Schachter (1968) investigated the relation between subjective reports of hunger and perceived time lapse in transatlantic airline crews. Due to time zone differences, perceived time lapse was much shorter than actual

time lapse for the flights involved. As predicted, the investigators found that significantly fewer obese crew members reported subjective hunger than nonobese crew members.

One related finding in Nisbett's (1968b) study was that there was a statistically significant association between subjective hunger and actual time lapse in normal-weight subjects, while there was no discernible association between these variables in obese subjects.

Taste

Evidence from several investigations indicates that food consumption is influenced more strongly by the taste of the available food, in obese subjects, than in nonobese subjects. Hashim and Van Itallie (1965) compared the consumptive behavior of hospitalized obese and nonobese patients, as a function of this variable. They found that, while obese and nonobese patients had pre-experimental consumption baselines of 3,500 calories/day and 2,200 calories/day, respectively, the consumption level of the obese patients dropped to an average level of 500 calories/day when supplied with only an unappetizing, but nutritious liquid diet. What made this result remarkable was the fact that the consumption of the nonobese patients remained at the pre-experimental level on the same liquid diet.

The main findings in Nisbett's (1968b) study support the conclusion noted above. Obese and nonobese subjects were divided randomly into two groups. One group was given roast beef sandwiches and Swiss cheese sandwiches to eat, after being required to skip the meal prior to the experimental session, and the other group was given nothing

to eat. Both groups were then asked to sample ice cream labeled "vanilla bitters." Half the subjects in each group received unaltered samples of good-tasting vanilla ice cream, while the other half of each group received samples of the same ice cream which had been mixed with quinine sulfate (2.5 gm/qt). The results were striking— obese subjects in both groups ate significantly more unaltered ice cream and less quinine-flavored ice cream than the nonobese subjects in either groups. As reported by Schachter (1971), Decke obtained similar findings using vanilla milkshakes treated and untreated with quinine sulfate.

In an uncontrolled but informative field study, Goldman (1968) found that obese freshmen at Columbia University cancelled their on-campus (cafeteria) meal contracts, in favor of off-campus dining, significantly more often than nonobese freshmen, despite the fact that such cancellations cost the students a \$15 penalty. Assuming the existence of a genuine difference in taste quality between the two dining options, it was suggested that this finding shows the differential taste-related response, between obese and nonobese subjects, reported in the experimental studies summarized above.

Visibility

Results from three experimental studies demonstrated that consumption in obese subjects is influenced more strongly by the visibility of available food than is consumption in nonobese subjects. Ross (1969) and Johnson (1970) showed that both relative opacity of wrapping material and the level of illumination influenced the

consumption level of obese subjects significantly more than that of nonobese subjects. Nisbett (1968a) demonstrated a similar effect, among others, when the consumption of obese and nonobese subjects was compared under two conditions: (a) open presentation of one roast beef sandwich and a bottle of soda, with many more similar sandwiches available in a nearby refrigerator and (b) open presentation of three roast beef sandwiches and a bottle of soda, with many more similar sandwiches in the refrigerator. Nisbett found that the obese subjects ate significantly fewer sandwiches in the first condition but significantly more sandwiches in the second condition- in comparison to nonobese subjects in the two conditions.

Accessibility-Response Cost

The experimental finding of Nisbett (1968a), discussed immediately above, might be explained in terms of food accessibility or response cost since, in the first condition, sandwiches beyond one were less accessible and "work" had to be expended if more than one sandwich was to be eaten by the subject. On this interpretation, one might expect that obese subjects are less likely than nonobese subjects to eat under conditions of low food accessibility and/or high response cost.

Studies by Schachter (1971) support this hypothesis. In one study, Schachter compared the consumptive behavior of obese and nonobese subjects in two conditions: (a) completion of an irrelevant task with shelled almonds readily available, and (b) completion of the same task with only unshelled almonds readily available. The

finding in this study was that, while there was no difference in consumption between obese and nonobese subjects in the second condition, significantly more obese subjects ate almonds in the first condition. In a second study, Schachter completed a field observation of eating behavior of obese vs. nonobese (Occidental) subjects in Chinese and Japanese restaurants. As expected, on the basis of the previous findings, significantly fewer obese subjects used chopsticks (high response cost), while dining in these settings, than did nonobese subjects.

Johnson (1970) reported an experimental finding which appears to require some modification of the foregoing results. Apparently, obese subjects are not unconditionally less willing than normals to exert themselves in obtaining food. According to Johnson, the amount of work an obese subject is willing to do to obtain food (unlike nonobese subjects) varies directly with the prominence of salient food cues (e.g., appearance, taste, visibility, etc.).

Emotional Arousal

Experimental findings concerning the behavioral effects of emotional arousal upon obese vs. nonobese subjects appear conflicting. A study by Schachter et al, (1968) showed that the consumption of crackers by obese subjects was not significantly different between conditions of high induced fear vs. low fear, regardless of pre-experimental fasting vs. no fasting. Yet, nonobese subjects in the deprivation-low fear condition consumed significantly more than any subjects in the other conditions. These findings seem to contradict

the commonly accepted idea that obese persons tend to eat excessively in response to unpleasant emotional arousal. In light of other evidence, however, and in consideration of possible inadequacy in achieving experimental deception and induced fear, Stuart and Davis (1972a) questioned the validity of this finding.

In a follow-up to the study done by Schachter et al. (1968), Conrad (1968) completed an experiment concerning consumption in obese and nonobese subjects under conditions of social rejection, social acceptance and neutral social response. Conrad's findings showed that obese subjects ate more under the rejection condition, while nonobese subjects ate less under this condition. In addition, the obese subjects tended to report a decrease in "boredom" following eating in the social rejection condition, while the nonobese subjects tended to report an increase in "boredom" in the same circumstances. Stuart and Davis (1972a) suggested these findings support some aspects of a "psychogenic" theory of obesity, which maintains that obese persons eat both in response to high emotional arousal and to alleviate under-arousal.

Other studies by Schachter (1967, 1968) have shown evidence which conflicts with that generated in the Schachter et al. (1968) study, as well. Schachter (1971) reviewed his own findings in the former studies and noted that obese subjects do not respond with reduced consumption to either induced fear or injected epinephrine, as do non-obese subjects. Again, the weight of a small amount of experimental evidence supports the contention that obese persons may respond by eating to both hyper- and hypo-emotional arousal.

Feedback

Evidence from two experimental studies supports the contention that obese subjects tend to consume more food in the absence of quantitative feedback than when such feedback is present, while non-obese subjects respond in the exact reverse. Goldman (1968) demonstrated this effect quite simply by either providing or preventing visual feedback concerning the quantity of milkshake consumed by obese and nonobese subjects. In a study involving varied sources of consumption feedback, Stuart (Stuart and Davis, 1972a) found that obese subjects ate significantly more under a condition of no feedback than under a condition of feedback from an external observer. Although nonobese subjects ate somewhat less in the self-monitoring condition than in the no-feedback condition, other sources of feedback showed effects not significantly different from the no-feedback condition. This evidence suggests that obese subjects' consumption is particularly sensitive to feedback from other persons concerning the amount eaten.

Response Effectiveness and Competing Cues

As mentioned, most recent investigators in this area recognize that the eating behavior of obese persons is largely under the control of external cues or conditions. Some attempt has been made to determine less obvious components of this external cue dependency. In an effort to provide integrating hypotheses in this area, Schachter (1971) cited the findings of Rodin (1970), which indicated that obese subjects out-perform nonobese subjects in simple and complex reaction time

tasks, when competing cues (distractions) are held to a minimum, but show inferior performance when the intensity of competing cues is allowed to reach a certain threshold level. Schachter argued that these facts, among others, imply that "any stimulus, above a given level, is more likely to evoke an appropriate response from an obese than from a normal subject" (p. 137). Stimulus prominence, he suggested, is the key to reactivity in the obese subject. With low levels of stimulus prominence, the obese are less reactive; with high levels, they are more reactive (in comparison to normals). This factor, he argued, accounts for much of the behavioral uniqueness of obese subjects, especially that involving the consumption of food.

Schachter's Hypotheses

Schachter and Rodin (Schachter, 1971) undertook a review of the available literature and completed a detailed comparison of the empirically validated characteristics of hypothalamic-obese laboratory rats and obese humans. Their efforts in this task were not accidental or impulsive, but were based on previous impressions that there existed remarkable similarities, in various specific behavior patterns, between said rats and humans. The following are brief statements of the similarities between hypothalamic-obese rats and obese humans identified by Schachter and Rodin. (a) Both hypothalamic-obese rats (in the static phase) and obese humans eat significantly more good-tasting food but significantly less quinine-laced food than comparable nonobese subjects. (b) Both eat slightly but not considerably more than normals (rats: +19%, humans: +16%). (c) Both eat fewer meals

per day (rats: -15%, humans: -8%). (d) Both eat more per meal (rats: +34%, humans: +29%). (e) Both eat faster than normals (rats: +28%, humans: +26%). (f) In comparison to nonobese subjects, obese rat and human subjects appear hyperexcitable, overemotional and hypoactive, (g) Both hypothalamic-obese rats and obese humans fail to regulate consumption when preloaded with solid food but do regulate, to some extent, when preloaded with liquid.

Summarizing the noted parallels, Schachter pointed out that the behavior of hypothalamic-obese rats and obese humans is stimulus bound. As discussed previously, he argued that the important variable relating to this characteristic is cue prominence. The available evidence, he suggested, indicates that both rat and human obese subjects are less reactive than normals, under conditions of low stimulus prominence, but more reactive under conditions of high prominence. After citing additional research concerning the functional roles of the lateral and ventromedial nuclei (emotion mediation and satiety control), Schachter suggested it may be reasonable to postulate that obese rats and humans share a common physiological dysfunction: a structural and/or functional impairment in the ventromedial nucleus of the hypothalamus. In all modesty, however, he acknowledged that the evidence in support of this hypothesis is strictly analogical, at this point, and he emphasized the need for substantiating experimental investigation. Bruch (1973) strongly questioned this theory, asserting that obese persons show a disturbance in visceral sensitivity and a pattern of external cue dependency which only mimics the effects found in hypothalamic-lesioned animals.

Family System Factors

Stimbart and Coffey (1972) stated, "The most obvious conclusion from a review of research on obesity in children and adolescents is that here is a problem with major practical and theoretical implications which is virtually untouched with regard to well-controlled experimental studies" (p. 18). The same conclusion can be drawn concerning the present state of research on family system variables involved in the etiology and maintenance of obesity in children, adolescents and adults. This point is unequivocally demonstrated in the publication of two recent anthologies of research reports pertaining to the etiology and treatment of obesity. A volume edited by Bray (1973) includes 57 individual research papers contributed to by over 100 participants. None of these papers reported research with a primary focus on family system variables. Another volume edited by Howard (1974) includes dozens of review articles and reports of original research. Again, none of these involved a significant focus on family system variables in obesity.

One might anticipate that the situation is better with regard to clinical case studies. With the publication of the early and potentially controversial report by Bruch and Touraine (1940), this anticipation promised to materialize. With the exception of Bruch's (1973) reiteration of the earlier findings, however, virtually no systematic case studies have been reported or published. One limited case study published by Zakus and Solomon (1973) focused

on Bruch's (1941) distinction between developmental and reactive obesity in children, as this relates to differences in mother-daughter relationships. Their clinical examination of mother-daughter pairs generated suggestive evidence that mothers of developmentally obese girls tend to experience greater conflict regarding their maternal role, while mothers of reactively obese girls tend to experience greater conflict regarding their sexual-marital role. While interesting, this is hardly a systematic investigation of the family system variables relevant to obesity.

Since the clinical findings and hypotheses of Bruch and Touraine (1940) are interesting and heuristic, they are summarized below as the only available empirical basis for an organized formulation of family system variables in the development and maintenance of obesity. In addition, a general theoretical model of family system factors in the development and maintenance of psychosomatic illnesses in children, published by Minuchin, Baker, Rosman, Liebman, Milman and Todd (1975) is summarized below. Although it was not developed with specific reference to obesity, the central components of this model appear to be in general correspondence with the most important variables identified by Bruch and Touraine (1940). As discussed in the subsequent section on present research needs, this model provided the primary research hypotheses for the empirical study reported in Chapters II and III.

Bruch and Touraine (1940) published the results of a comparative case study involving forty obese children and their families. The obese children included 18 girls and 22 boys. The distribution of racial backgrounds was 60% Jewish, 20% North European, 10% South

European, 3% American Negro and 7% Mixed. Most of the parents were foreign-born. The socioeconomic level of all the families was low: 12 were on public welfare, 7 were supported at least partially by relatives and 21 were marginally self-supporting. The size of the families was unusually small. The average number of children was 2.1, whereas the average number in a comparison group of families was 3.09.

The fathers in most of the families were described as generally weak, unaggressive, resigned and passive. They typically described themselves as having maintained a strong bond with their own parents. The mothers were described as verbose, self-centered, self-pitying and prone to deceptively favorable self-presentation in the maternal role. They, too, were described as maintaining excessively dependent emotional ties with their own parents. They were characterized as afraid of the adjustment and adaptation demanded by a changing world. The spouse relationships were described as wife-dominated, except in five cases of rough equivalence. In 11 families, the spouse relationship was described as chronically and openly conflicted. In 10 other families, conflict was more submerged, but the wives were typically outspoken in their attitudes of disloyalty toward their husbands. All spouse dyads were characterized by an absence of common interests and little participation in social activities outside the narrow family circle.

The relationships between the fathers and obese children were described as often mildly positive but generally weak in emotional involvement. The fathers were described as typically peripheral

to the mother-child dyad. In most cases, involvement between the father and obese child was subverted by the mother and otherwise vitiated through a variety of interactional mechanisms. Because of their relatively weak position in the family constellation, these fathers did not provide the children with effective masculine guidance or role modeling. Their lack of strength in the family system was considered to magnify the importance and influence of maternal attitudes and behavior on the obese child.

Many of the mothers expressed negative attitudes toward the sex of the obese child. The preference generally expressed was for female children. A rationale frequently given was that girls will stay closer to their mothers. Many of the mothers expressed attitudes implying that they had not particularly wanted the obese child from birth. The relationships between the mothers and obese child were described as overprotective but significantly lacking in positive rapport, trust and confidence. The overprotective attitude was typically manifested in exaggerated concerns for the child's physical health and safety and in numerous restrictions on the child's contact with the physical and social world outside the narrow family circle.

The maternal attitude was further described as typically insecure and demanding toward the child's affection and devotion. Maturation and separation from the home were experienced as intensely threatening and were constantly defended against through infantilization of the obese child. This continuous infantilization was manifested through the mother's dressing and bathing the child many years beyond an age

of more appropriately mature self-care. It was most dramatically expressed through the prolonged continuation of feeding practices which are appropriate only for young infants. Many of these obese children were bottle-fed well beyond the first year. Many mothers continued to mash the child's food and even spoon-feed the child for several years. Food selection tended to perpetuate infantile preferences. Rejection of food by the child typically stimulated great distress in these mothers. Food was characterized as having unusual emotional significance in the generally precarious relationships between these children and their mothers. It was endowed with the prepotent capacity to smooth over conflict, express love and affection, and relieve emotional distress.

Although the mothers' attitudes toward their obese children were strongly overprotective and infantilizing, they contained powerful components of unrealistic ambition for social success and condemnation for perceived social inadequacy. These dimensions reflected the fundamentally ambivalent and undermining nature of the typical maternal attitude toward the obese child. High expectations for social success were frequently communicated to the child, but any realization of these was undermined by various forms of infantilization. The child's inadequacy was further reinforced through criticism and condemnation.

The parental attitude toward the health of the obese child was further described as paradoxical. Virtually all of these families showed little concern about the obesity itself. Most of the parents would not have brought their obese children to the attention of

medical professionals had they not been strongly urged to do so by schools or other outside sources. Yet, the same parents, especially the mothers, showed a strong, obsessional concern over other aspects of the child's health. There was a high incidence of medical symptoms, among these children, which reflected unusually intrusive involvement by the mothers. For example, enuresis was observed in about 40% of the obese children studied. This incidence was considerably above the expected level,

Bruch (1973) reviewed the orientation and results of the 1940 study and stated two important conclusions: (a) the search for a uniform family picture in the development of all types of obesity is misguided, and (b) the identification of any single factor in the family constellation to account for the development of obesity is insufficient. While maintaining the validity of the general clinical picture constructed previously, Bruch emphasized the need to shift the explanatory focus to the dynamic interaction of all members of the family system and the special role that the obese child's development plays in it. From this point of view, it was hypothesized that the obese child is "elected" to a role in the family system which functions to compensate the parental subsystem for its disappointments, frustrations, deficiencies and unresolved conflicts. In this way, the boundaries between the parental subsystem and the obese child remain poorly defined, since the child is repeatedly drawn into the parental relationship to compensate for its deficiencies. The specific interactions that constitute this dynamic mechanism vary considerably from family to family. However, its functional character was

considered fundamental in the family frame of the developmentally obese child.

To summarize the conclusions of Bruch's clinical case studies, the family system of the developmentally obese child would typically be characterized by five fundamental interactional factors:

(a) chronic, unresolved marital discord, (b) general exclusion of the father from an overinvolved mother-child relationship, (c) overprotecting and infantilizing orientation of the mother toward the child, (d) parental reinforcement of overeating and low motor activity through overprotection and condemnation of perceived inadequacy, and (e) the obese child's role functioning to compensate the family system for inadequacies in the parental subsystem. As indicated previously, these factors appear to correspond basically with the components of a general family system model of psychosomatic illness in children developed by Minuchin et al. (1975). The essentials of this model are summarized below, and how the model appears to accommodate Bruch's findings is discussed.

Minuchin et al. (1975) reviewed the previous research concerning psychological factors in childhood psychosomatic illness (i.e., asthma, superlabile diabetes and anorexia nervosa) and concluded that it was predicated, by and large, on a one-way linear model of causality. They criticized this model in terms of three considerations: (a) the research shows no single or simple etiological factor sequence; (b) the linear model erroneously conceptualizes the child as a passive recipient of unfavorable environmental circumstances; and (c) the assumption that the psychosomatic disturbance is located only

within the child severely restricts the range of applicable therapeutic interventions. As an alternative, Minuchin proposed an open system model which broadens the focus from the sick child alone to the sick child within the family. The basic postulates of the model are that (a) certain types of family systems favor the development and maintenance of psychosomatic symptoms in children and (b) the child's symptoms play a central role in the maintenance of homeostasis in these systems. The second postulate includes the assumptions that there is a turn-on phase, in which some family conflict induces emotional arousal and physiological symptoms in the child, and a turn-off phase, in which family conflict dissipates and physiological symptoms subside.

The basic components of the open system model were elaborated, on the basis of a seven-year research program conducted by Minuchin et al. (1975) concerning the family structures of children suffering from asthma, superlabile diabetes and anorexia nervosa. The model stipulates that three general factors are necessary and sufficient for the development of severe psychosomatic illness in children:

- (a) physiological vulnerability in the child;
- (b) family organization characterized by the transactional properties of enmeshment, over-protectiveness, rigidity and lack of conflict resolution; and
- (c) a central role for the child's symptoms in the family pattern of conflict avoidance.

The researchers emphasized that this model does not imply symptom specificity in relation to a particular family organization. Instead, it describes several interrelated general

factors considered necessary for the development of any severe psychosomatic disturbance in children.

Although this model was not developed with reference to childhood obesity, its applicability appears potentially valid. The assumption of physiological vulnerability is consistent with information available concerning early adipose tissue development and the probable influence of genetic factors. The four family transactional properties described are consistent with Bruch's (1940, 1973) clinical observations. First, the relationship between the mother and obese child was described as typically enmeshed, such that there were few clear boundaries between maternal and child behaviors, feelings and thoughts. Second, the parents, especially the mothers, were seen as generally overprotective of the obese child, in that any medical symptom, other than the obesity itself, was frequently subjected to obsessional concern, and the child's freedom in physical and social activity was constantly restrained. Third, the family transactional patterns were rigidly maintained, to the extent that infantile patterns of feeding and self-care were typically extended well into later childhood years. Fourth, parental conflicts typically remained unresolved, and an aura of parental conflict chronically permeated family life. Finally, the notion that the obese child's primary symptoms, chronic overeating and avoidance of muscular activity, play a central role in the family's pattern of conflict avoidance was particularly prominent in Bruch's (1973) analysis of the family frame. Bruch stated that the obese child assumes an active role, in coalition with the mother, which

compensates the parental subsystem for its inadequacies and helps it avoid conflict.

The potential validity of this application of Minuchin's model to the development of obesity appears significant for two reasons. First it would greatly expand and fundamentally modify the causal analysis of this clinical syndrome. Second and most importantly, it would make available relatively new therapeutic techniques which were developed on the basis of the model's primary hypotheses. As indicated in the subsequent section concerning family therapy, such techniques have not yet been adapted to the treatment of obesity in children or adults. Although the effectiveness of such techniques has been demonstrated in the treatment of other psychosomatic disturbances in children, their application to obesity, without empirical validation of the underlying conceptual model, would be premature. The implication is that a primary research need is for empirical investigation of the applicability of this conceptual model, or some alternative model of family system factors, to the development of obesity. In a subsequent section, this point is discussed in the context of a more general analysis of the present needs in the field of obesity research.

Summary

Since the present major section has been fairly long and included discussion of a number of empirical findings, a summary list of the most important results reviewed is provided below for ease in reference. The following summary statements are presented in the same order that the findings were discussed in the previous text.

1. An inverse relationship exists between socioeconomic status and the prevalence of obesity, at least in Western cultures.
2. Younger persons demonstrate greater concern for weight problems and actually attempt weight loss more frequently than adults.
3. The hypercellular, massively obese (usually childhood-onset) probably have considerably greater difficulty in achieving significant fat reduction than other obese persons, due to some disturbance in adipose tissue metabolism.
4. Children of obese parents have a much greater risk of developing obesity than those of nonobese parents.
5. Most psychodynamic formulations about obesity have generally been inconsistent, unvalidated by empirical research and of little value in differentiating obese persons from nonobese persons. One exception is the systematic clinical work of Bruch. On the basis of 40 years of meticulous clinical observations, Bruch classified obese persons into three general groups: (a) the constitutionally obese, (b) the reactive obese, and (c) the developmentally obese. Persons in the first group appear to have no psychological disturbance involved in the obesity. Those in the second group appear to eat as a neurotic defense against anxiety or depression. Those in the third group show an eating disturbance which is developmentally interwoven with severe deficits of inner differentiation and social individuation. The developmentally obese generally experience themselves as being under the influence of external forces, and their eating behavior is conditioned to many inappropriate internal and external cues. Further, they typically manifest severe disturbances in body

image such that they may misperceive its size and gender, and mis-evaluate the social significance of their physical qualities,

6. Corroborative, experimental evidence exists that some obese persons manifest serious body image disturbances, usually involving marked affective devaluation of the self and distortions in the perception of body size, which are strongly refractory to modification. Apparently, these disturbances seriously impede efforts at weight loss.

7. Obese persons are significantly less likely to report hunger or to eat in association to gastric contractions than nonobese persons.

8. Obese persons regulate their food consumption, to some extent, when preloaded with liquid, but not when preloaded with solid food.

9. The consumptive behavior of obese persons is influenced by external stimulus conditions much more strongly than that of nonobese persons. The external stimulus factors of greatest impact, in this regard, include perceived time lapse, food taste quality, food visibility and accessibility, response cost, quantitative feedback, and stimulus prominence. It is probable, as well, that obese persons often respond with eating to internal conditions of hyper- and hypo-emotional arousal.

10. Schachter's hypotheses about obesity, derived from a detailed comparison of research concerning the behavior of hypothalamic-obese rats and that of obese humans, were summarized briefly. On the basis of the fact that the behavior of both hypothalamic-obese rats and obese humans is stimulus-bound (behavioral reactivity being largely dependent on cue prominence), Schachter suggested that obese humans

may suffer from a structural and/or functional impairment of the hypothalamus. He acknowledged, however, that this hypothesis is only analogical. Bruch's contention that the obese person's behavior only mimics that of lesioned animals was cited as an additional reservation.

11. Virtually no systematic empirical studies concerning family system variables in the development and maintenance of obesity have been reported. The only empirically based information available comes from the extensive clinical case studies conducted by Bruch and Touraine (1940). From these studies, five fundamental interactional factors were identified as typical of families with developmentally obese children: (a) chronic, unresolved marital discord, (b) general exclusion of the father from an overinvolved mother-child relationship, (c) overprotecting and infantilizing orientation of the mother toward the child, (d) parental reinforcement of overeating and low motor activity, and (e) the obese child's role functioning to compensate for inadequacies in the parental subsystem.

12. It was suggested that Bruch's interactional factors, in developmental obesity, appear to basically correspond with the primary components of the family system model of psychosomatic illness in children developed by Minuchin. These components include (a) enmeshment, (b) overprotectiveness, (c) rigidity, and (d) lack of conflict resolution. The model also involves two basic postulates of physiological vulnerability in the child and a pattern of conflict avoidance in the family through the child's symptoms. It was suggested that empirical validation of some variant of this model for obesity would have significant theoretical and therapeutic implications.

Treatment of Obesity

Nonbehavioral Treatments

Although most of the empirical literature concerning the treatment of obesity primarily involves behavioral procedures, a discussion is presented here concerning the comparative status of the traditional medical treatment of obesity and that of various contemporary non-behavioral treatments. Of the latter category, drug therapy, bypass surgery, hypnosis, psychodynamic psychotherapy, and family therapy are discussed. The following comments, though somewhat brief, help provide a broader context within which the experimental results concerning various behavioral procedures can be interpreted.

Traditional Medical Treatment

Several hundred reports of traditional medical treatment of obesity, published between approximately 1928 and 1958, have been reviewed by Stunkard and McLaren-Hiome (1959). Of these hundreds of papers and reports, all but eight were excluded from discussion because of methodological and data reporting short-comings which made the treatment results largely uninterpretable. The eight remaining publications, while reporting data from research projects which would not be considered truly experimental by modern methodological standards, yielded quantitative results concerning the percentage of patients in treated samples that have shown a moderately favorable response to medically administered and supervised diet regimens, with and without adjunctive drug therapy. With some expressed astonishment.

Stunkard and McLaren-Hume pointed out that, with only one exception, none of the eight authors "reported even the modest success of a 20 lb. weight loss in more than 29% of his patients." (pp. 79-80)

Further, in samples consisting largely of massively obese patients, none of the authors reported a weight loss of 40 lbs. or greater in more than 8% of their patients.

Stunkard and McLaren-Hume concluded that, while the results reported in these eight publications "are remarkably similar and remarkably poor," they are probably superior to the results obtained by the average physician or clinic using similar treatment procedures. To test the validity of this conclusion, they undertook an investigation of the treatment results for 100 consecutive patients treated for obesity in the Nutrition Clinic of the New York Hospital. The therapeutic approach taken in this clinic emphasized primarily medically supervised diet regimens, although some patients in the sample received adjunctive drug therapy in other clinics of the hospital. The results of the investigation were even worse than had been expected. At termination of treatment, only 12% of the patients lost as much as 20 lbs., and only one patient out of the 100 lost 40 lbs. Further, 28% of the patients in the sample dropped out of treatment entirely after their first clinic visit. At a two-year follow-up, only two patients in the sample had maintained a weight loss of 20 lbs. or more.

On the basis of these results, it seems justifiable to conclude that the traditional treatment of obesity, emphasizing medically

administered and supervised diet regimens, has largely failed to meet the therapeutic needs of the vast majority of obese persons.

Drug Therapy

The use of drugs in the treatment of obesity has, unfortunately, been uncritically accepted by thousands of practicing physicians (Bruch, 1973). Thyroid medications and amphetamines have been widely used for this purpose since the early 1940's. More recently, HCG (human chorionic gonadotrophin) has been prescribed. Bruch (1973) observed that the use of amphetamines and thyroid medications for treating obesity has proven generally ineffective and often harmful to patients thus treated. Kroger (1970) and Fuller (1974), among others, have supported Bruch's conclusion in this area, and recent experimental evidence has indicated a lack of effectiveness for HCG (e.g., Frank, 1964; Young, 1974). It has been repeatedly argued that medications cannot, in principle, be of much assistance to the obese patient, since they have essentially no significant impact on the central problems of personality deficits, environmental influence and behavioral control.

Bypass Surgery

Considerable research has been reported concerning the therapeutic and side effects of various gastric- and intestinal-bypass surgical procedures in the treatment of massive obesity (e.g., Clinton and Mason, 1973; Dano, Jainiom and Vagn-Neilsen, 1973; Corso and Joseph, 1974). The results of much of this research were summarized recently by McFee (1974). McFee pointed out that such surgical bypass procedures

have been in use for approximately 20 years and are now reserved for "morbidly" obese patients whose gross body weight has been two to three times normal for five years or longer. Most such procedures have demonstrated a predictable two-phase effect on obesity: (a) rapid weight loss during the first few months after the operation, followed by (b) stabilization of weight below previous levels, but considerably above the normal level. The most pervasive side effect of these procedures is persistent diarrhea, and common complications include upper GI bleeding, wound infections, post-operative hernia, and 5-8% mortality risk. McFee attributed much of the therapeutic effect associated with these procedures to altered eating patterns that are made necessary by the constant threat of diarrhea. Because of the untoward side effects and relatively limited effectiveness ceiling, these surgical procedures are invariably reserved for the most advanced and refractory cases.

Hypnosis

A number of papers have been published in recent years concerning the use of hypnosis in the treatment of obesity (e.g., Erickson, 1960; Hanley, 1967; Kroger, 1970; Wick, Sigman and Kline, 1971; Smith, 1972). In general, these papers (and many like them) represent assemblages of extensive exposition on subtle technique, dramatic narrations of paradigm cases, and impressive claims of therapeutic success. Indeed, some of this literature is quite fascinating and may have an alluring appeal for the practitioner (e.g., especially the work of Erickson), But, it is safe to say that the therapeutic use of hypnosis in the

treatment of obesity has rarely, if ever, been carefully evaluated with the more sophisticated of modern experimental methodologies and statistical procedures (Stuart, 1971). Virtually every report of treatment results is a case study. Unfortunately, this state of affairs leaves the comparative status of this approach much in doubt. It is largely impossible, at this point, to make a rational judgment concerning which of the many diverse, often esoteric hypnotic techniques, utilized and reported by the "experts," are necessary or even useful in the treatment of obesity. It is to be hoped that a systematic application of acceptable research methodology, in the near future, will provide some empirical data concerning the usefulness of hypnotic procedures in this area.

Psychodynamic Psychotherapy

The plight of psychodynamic psychotherapy is much the same as that of hypnosis, although a few studies which have experimentally compared approaches of this general type to behavioral procedures (e.g., Wollersheim, 1970; Penick, Fillion, Fox and Stunkard, 1971), Although these results are sometimes slightly better than those obtained with the traditional medical-diet approach, they are relatively inferior, on a short-term basis, to those obtained by complex behavior therapy procedures. Case reports continue to appear, however, and the use of psychodynamic psychotherapies in treating selected obese patients, especially those refractory to various behavioral procedures and/or suffering from serious body image disturbances (Stunkard and Mendelson, 1967), may still be uniquely appropriate.

Bruch (1973) argued that intensive individual psychotherapy is uniquely indicated in cases of developmental obesity. As summarized previously, the obesity for these persons is described as having an onset in childhood and as symptomatic of poor differentiation of inner experience and inadequate individuation in the social and physical environment. Bruch emphasized that the individual therapy appropriate for these cases cannot be based, however, on the psychoanalytic model emphasizing the interpretation of psychic conflicts and symbolism. Rather, it must be based on what she termed "the constructive use of ignorance" (p. 338): an approach in which the therapist generally withholds interpretation, but actively supports any response initiated by the patient that would enhance the differentiation of inner experience and development of self-awareness. Bruch further emphasized that the therapeutic focus cannot be on the abnormal eating itself, but must be directed toward the underlying conceptual and perceptual disturbances in self-awareness. She observed that, without adequate understanding and therapeutic focus toward these underlying disturbances, efforts at weight loss invariably have no long-term success. This is a criticism she levels equally at psychodynamic psychotherapy and behavior therapy approaches. She riveted this point strongly with the observation that virtually all the empirical evidence (clinical and experimental) now available indicates that, while these and other approaches can easily demonstrate short-term weight changes, they fail overwhelmingly to generate lasting improvement.

In this context, it is worth noting again Bruch's (1973) comments concerning the treatment of constitutional obesity and reactive

obesity- Concerning the former, she indicated that dietary management is usually sufficient in assisting the obese person to maintain a satisfactory weight. Concerning the latter, psychotherapy of the traditional type, ioe., therapy aimed at uncovering, interpreting and working through emotional trauma or conflict, is seen as uniquely appropriate. The suitability of the more conventional approach is explained in terms of the formulation that overeating, for these people, seems to ward off unpleasant affect states, especially anxiety and depression.

Family Therapy

Family therapy, based on a system model of psychopathology and behavior disturbance, emerged as a viable treatment modality in the past two decades. Considering the early publication of Bruch's (1940) clinical observation concerning the family frame of the obese child, one might have anticipated several clinical or experimental applications of this type of approach in the treatment of obesity. This expectation would not, however, correspond with the present reality. A careful review of the available clinical and research literature in this area has revealed no application of a family system model in the treatment of obesity- Further, Minuchin (1977) stated that he knows of no publication or ongoing research project primarily involving this approach. The only literature related to such an application includes Bruch's (1973) observation about the need for family involvement and Minuchin's (1975) research concerning the family therapy treatment of other psychosomatic problems. The relevant and heuristic aspects of

this material are summarized below, and some conclusions are drawn concerning its potential significance in the treatment of obesity.

Bruch's (1973) conclusions about the need for individual psychotherapy, in cases of developmental obesity, are placed in the broader context of a recognition that the therapist must also deal with the patient's family and social network. She reiterated the central fact that these obese persons grow up in an intense involvement with their families, especially with their mothers, which impedes the development of inner differentiation and autonomy. This feature is so powerful in maintaining their disturbed adjustment, that she "cannot conceive of successful therapeutic work without changing the noxious interaction " (p, 343). She pointed out that it is typical for these families to interfere, in one way or another, with the therapeutic progress of the obese patient. Although the parents or spouse may complain unremittingly about the patient's immaturity and lack of independence, they must be actively assisted in permitting the patient to change and in finding satisfying substitutes for their preoccupation with the patient's behavior. Bruch did not, however, formulate a family therapy approach to this problem and offered no technical guidelines for dealing with it in this modality. Unfortunately, neither has anyone else. It seems necessary to turn, once again, to the general family system model of psychosomatic illness developed by Minuchin,

To reiterate, Minuchin et al. (1975) developed a family system model of psychosomatic illness in children that involved four family system characteristics and one dynamic principle. The family system

characteristics included enmeshment, overprotectiveness, rigidity and lack of conflict resolution. The dynamic principle was that the child's psychosomatic symptoms play a central role in the family's pattern of conflict avoidance. As part of their seven-year research program, Minuchin et al. (1975) developed family therapy intervention strategies aimed specifically at modifying each of these family system properties. They utilized these strategies in treating the families of many patients suffering from anorexia nervosa, superlabile diabetes and intractable asthma. They reported the long-term treatment results for 13 diabetic patients, 10 asthmatic patients and 25 anorectic patients. In contrast to very discouraging results from other types of treatment previously utilized with these patients, the intervention through family therapy was apparently quite successful in virtually every case. Complete remission or substantial improvement was reported for most cases several years after treatment.

As mentioned in a previous section, the foregoing research results are of potential significance for the treatment of obese patients. If the Minuchin model of psychosomatic illness can be generalized to obesity, at least in one developmental type, then a new and useful approach to conceptualizing and treating the disorder may be available. Although there is suggestive evidence from Bruch's (1940) early work on the family frame of childhood obesity, it is clear that systematic research is still necessary if this model or some modification of it is to be considered valid in this area. In a subsequent section, the need for further research in this area is weighed against

other research needs, in an effort to devise a timely research project and, later, to plan a rational research program.

Behavioral Treatments

Largely in response to the now widely publicized failure of the traditional medical approach to treating obesity, a number of alternative therapeutic approaches, broadly characterized as behavioral, have been developed and applied in the past 15 years. Many of the techniques subsumed in these approaches were developed within three theoretical/empirical frames-of-reference: classical conditioning theory, operant conditioning theory, and the experimental analysis of consiimptive behavior in obese persons. Most of the controlled, experimental investigations of the treatment of obesity have involved one or a combination of such behavioral techniques. This is the primary reason why the present subsection is so lengthy.

In this subsection, the empirical findings concerning the efficacy of each of several groups of behavioral procedures are summarized, and a representative sample of published investigations related to each procedure group is described. Although various portions of this information have been presented in previous reviews (e.g., Stunkard, 1971; Stuart and Davis, 1972a; Abramson, 1973; Hall and Hall, 1973, 1974), the present review is both more comprehensive and more critical. While not exhaustive of all relevant publications, this subsection provides an informative and reliable impression of the significant research findings and empirical investigations in this area to date.

The categorical organization of the information in this subsection follows the basic system utilized by Hall and Hall (1973), which was introduced by Mahoney (1972). Essentially, behavioral procedures for the treatment of obesity are divided into two broad types: Experimenter-Managed procedures (EM) and Self-Managed procedures (SM). EM techniques are those in which the focal reinforcers or contingencies are primarily controlled by the experimenter (or therapist). SM techniques are those in which the focal reinforcers or contingencies are primarily controlled by the subject (or patient). Although there is a discernible tendency for respondent procedures to appear in the EM group and for operant procedures to appear in the SM group, the match is not invariant. In addition, because of functional weaknesses in any such system, the classification of reported empirical investigations is not wholly unambiguous. Many investigations involve treatment combinations with techniques from both classes. Be this, as it may, the essential meaning of the following information should be quite apparent.

EM Procedures

Aversive conditioning techniques

Electric shock. One basic paradigm for the use of electric shock in the treatment of obesity was described in a case reported by Wolpe (1954). In this case, painful electrical stimulation was delivered cutaneously to a 36-year-old obese woman, contingent upon her report of experiencing images of problematic foods. Wolpe reported that the woman developed unpleasant subjective feelings in association with

thoughts of the target foods and lost weight steadily during five treatment sessions (before she died of unrelated causes).

Meyer and Crisp (1964) reported two cases of obesity treatment in which electrical shock was delivered contingent upon actual physical approach to problematic foods. One subject was a 205 lb., 21-year-old obese woman who was addicted to amphetamines. The other was a 241 lb., 51-year-old obese mother. The first subject received five shocks during the first treatment session and, thereafter, did not approach (reach for) the problematic foods during the next 30 sessions. Reportedly, she lost 30 lbs. during six weeks of treatment and had lost an additional 42 lbs. at a two-year follow-up. The second subject refused further treatment after receiving the first shock and had gained an additional 25 lbs. at the two-year follow-up.

On the basis of these reports alone, it is impossible, of course, to draw any general conclusions about the effects of aversive electrical stimulation in the treatment of obesity. One controlled experimental study has been reported, however, concerning the effects of this technique, Stollak (1967) assigned 138 moderately obese (20-30% overweight) male and female subjects, on a partially random basis, to one of six treatment conditions: no-contact control, no-treatment control, no-contact diary, contact-diary, contact-diary-noncontingent shock, and contact-diary-contingent shock. The noncontingent shock subjects received electrical shock on a noncontingent basis during treatment sessions with an experimenter, while the subjects in the contingent shock condition received electrical shock contingent upon

their description of favorite foods. All subjects in the last four conditions kept food diaries according to instructions. Premature termination ranged from 9% (no-contact-diary) to 40% (contact-diary-noncontingent shock). Treatment lasted for eight weeks and follow-up was done at approximately two months. At the termination of treatment, the subjects in the contact-diary condition had lost significantly more weight than those in the other conditions, although the differences were generally nonsignificant at follow-up.

Although the results of Stollak's investigation do not support claims of therapeutic efficacy for electrical shock in the treatment of obesity, it has been suggested that this experiment did not constitute a fair test of the target procedures (Hall and Hall, 1973). Due consideration was apparently not given to optimal sequencing and pacing of the stimuli involved in these attempts at aversive conditioning. On the basis of the available evidence, then, it appears impossible to draw a sound conclusion concerning the relative effectiveness of aversive conditioning, through electrical stimulation, in the treatment of obesity.

Aversive odor. Kennedy and Foreyt (1968) reported a case study in which the noxious odor of butyric acid was paired with the odor of problematic foods (through a gas mask apparatus), in a classical conditioning paradigm. The subject, in this case, was a 29-year-old female who weighed 322 lbs. At the end of 22 weeks of this treatment, she had lost 30 lbs., but had increased consumption of nontargeted food items.

Foreyt and Kennedy (1971) completed an experimental study using the same target procedure. Twelve overweight (10% or more) women were divided into two groups: the experimental group and a no-contact control group. At the termination of nine weeks of treatment, the experimental group subjects had lost an average of 13.33 lbs., while the control group subjects had lost an average of only 1 lb. At a 48-week follow-up, the experimental group subjects had lost an additional 9.2 lbs., on the average, while the control group subjects had gained an average of 1.3 lbs. The difference between the experimental and control groups was significant both at posttreatment and follow-up.

Unfortunately, the group composition represented a confounding variable. The experimental group consisted of three undergraduate students and three TOPS members. Further, the experimental group subjects were, on the average, 17.93 lbs. heavier and 17.17 years younger than the control group subjects. The confounding variables prevent an adequate interpretation of the data in this study. Consequently, as in the case of aversive conditioning through electrical stimulation, the relative effectiveness of aversive conditioning using aversive odors in the treatment of obesity is still indeterminate.

Covert sensitization. Cautela (1966) reported treating a 49-year-old, 200 lb. woman with covert sensitization. A typical imaginal induction was utilized in which visualization of approach to problematic foods was paired with imagined vomiting. This treatment lasted for 16 weeks, during which the woman lost 66 lbs. At a seven-month follow-up, this weight loss had been maintained. Cautela (1972) has since

elaborated the technique used to include imagined reinforcement of desirable eating behavior.

Stuart (1967) reported the use of Cautela's technique in the cases of two women who were having great difficulty controlling compulsions to eat specific favorite foods, while participating in a SM program for weight reduction. Although data were not presented, Stuart concluded that his application of this procedure, in these cases, was "highly successful" in reducing between-meal eating.

In an unusually well-designed study, Foreyt and Hagan (1973) divided 45 overweight female college students (stratified random assignment) into three groups: covert sensitization, covert sensitization placebo, and no-treatment control. The two treatment group procedures were identical except that pleasant scenes were substituted for scenes of nausea and vomiting, in the covert sensitization placebo condition. Each experimenter conducted one group under each condition, and potential experimenter effects were subsequently evaluated and discounted. The experimenters in this study were two licensed clinical psychologists who had previously conducted major investigations in the treatment of obesity. All subjects who entered the study were required to deposit \$5.00 with the experimenters to ensure minimal compliance with the experimental procedures. Six subjects (13%) failed to complete the program, but subsequent statistical tests showed no significant resultant group differences. Subjects in each treatment group participated in 18 treatment sessions over a period of nine weeks. The subjects in the control group were evaluated prior to and following the same nine-week period.

Residual gain scores were used to evaluate treatment effects on weight loss. Analysis of variance (ANOVA) on these scores showed no significant differences between the three conditions. Direct examination of the mean weight-loss scores for each condition revealed that the covert sensitization placebo group lost, on the average, better than twice as much weight (8.5 lbs. vs. 4.1 lbs.) as the covert sensitization group, during the nine-week treatment period. The mean difference in weight loss at a nine-week follow-up was even larger (7.1 lbs. vs. 1.2 lbs.), although neither difference was statistically significant. Further, the effect of the treatment conditions on change in reported palatability of target foods (pretreatment to posttreatment) was significantly different in favor of the placebo condition. Foreyt and Hagen concluded that covert sensitization, as a precisely defined, specialized technique, has no significant therapeutic effect, in the treatment of obesity, beyond that explainable solely in terms of suggestion and attention.

Harris (1969), Meynen (1970), Manno and Marston (1972), and Janda and Rimm (1972) conducted other experimental tests of covert sensitization and obtained results that support the foregoing conclusion. Thus, although there are claims for therapeutic effectiveness of covert sensitization in the treatment of obesity, the experimental evidence seems to support the contention of no unique (as opposed to nonspecific) benefit. The issue could be further clarified, perhaps, if a series of carefully controlled studies were done to separate the effects of nonspecific treatment factors from those due to a strict rendition of the covert sensitization procedure.

Induced anxiety. Bornstein and Sippelle (1973) reported an experimental investigation of a technique they termed "induced anxiety" (IA), in the treatment of obesity. According to their description, the purpose and presumed mechanism of effect of this technique are similar or identical to those claimed for implosive therapy. Briefly, IA is aimed at reducing or extinguishing anxiety responses through instructing the subject to confront his sensations of anxiety directly and experience them to the fullest extent possible. Unlike implosive therapy, however, IA apparently does not utilize highly elaborate and convoluted aversive imagery. Rather, it teaches the subject "how to cope with internal sensations of anxiety irrespective of the situational cues associated with arousal" (p. 341).

In the reported investigation, Bornstein and Sippelle randomly assigned 40 overweight subjects to one of four experimental conditions: no-treatment control, nonspecific group therapy, relaxation group therapy, and group-based IA. The average percentage overweight for the subjects in each condition was approximately 52%. All treatment procedures were applied, in a group setting, once per week for eight consecutive weeks. The results showed a significant difference in weight loss between the IA group and the no-treatment control group, but no other significant differences between groups, at post-treatment, were found. At three-month and six-month follow-ups, the IA group showed an average weight loss which was significantly greater than that shown by each of the other three groups, while no significant differences existed among the latter groups.

While Bornstein and Sippelle concluded that these results indicate that group-based LA constitutes a highly effective treatment for obesity, this conclusion cannot be readily accepted until corroborating evidence is provided by additional experiments. Further, the basic experimental literature concerning the behavioral characteristics of obese persons indicates that various internal and external variables may be more important in the development and maintenance of obesity than anxiety. In this context, it is reasonable to assume, until proven otherwise, that a significant long-term modification of obesity requires therapeutic focus on a number of factors beyond experienced anxiety.

Experimenter mediated reinforcement

/ Ayllon (1963) reported one of the earliest applications of overt, experimenter-mediated reinforcement in the treatment of obesity. The subject in this case was a seriously obese (250 lb.) hospitalized schizophrenic whose focal symptoms included food stealing and over-eating. Ayllon manipulated effective reinforcers by simply removing the subject physically from the dining area whenever she either approached tables other than her own or attempted to eat unauthorized food items. At two days following the initiation of this procedure, the subject's eating behavior had reached criterion standards, and she demonstrated a steady rate of weight loss, losing 70 lbs. in 14 successive months.

/ Bernard (1968) reported similarly impressive results in the use of a token reinforcement system, with a 407 lb, hospitalized female

schizophrenic patient. She was placed on a restricted diet and paid tokens at a rate of ten per lb. lost. These tokens were redeemable for privilege-type back-up reinforcers, but not for food. In 17 weeks of treatment, this patient lost 70 lbs. During a subsequent 6-week extinction period, she lost an additional 18 lbs., at a slightly slower rate, but no tendency toward reversal was apparent. Follow-up data were not reported.

Moore and Crum (1969) reported the application of social reinforcement alone in the case of a 24-year-old obese hospitalized schizophrenic woman. Baseline weight was recorded for two weeks prior to initiation of the reinforcement procedure, which consisted of expressed approval from the experimenter, on a daily basis, if the subject demonstrated weight loss, and expressed disapproval when weight gain was shown. The patient showed a total weight loss of 35 lbs. over a treatment period of 28 weeks. At a visit to her home, 16 weeks from initiation of treatment, she demonstrated no reversal in weight loss, as she had during a similar visit eight weeks earlier. The authors interpreted this result as indicating enhancement of self-control and some loss of dependence on external reinforcement.

Harmatz and Lupac (1968) published the first experimental investigation of EM reinforcement in this area. Twenty-one hospitalized, obese, schizophrenic men were randomly assigned to one of three treatment conditions: no-treatment control, social pressure - social reinforcement group therapy, and behavior modification. The latter (focal) condition consisted of depriving subjects of specified portions of their \$5.00 weekly allowance contingent upon failure to lose

weight at weekly intervals. At the end of six weeks of treatment, the behavior modification and group therapy subjects had both lost, on the average, significantly more weight than the no-treatment control subjects, but there was no significant difference between the two treatment groups at this point. At a four-week follow-up, the behavior modification subjects had lost additional weight, while the group therapy subjects had regained much of their previously lost weight. The difference between these two groups was then significant, while the difference between the group therapy condition and the no-treatment control condition was not.

Harris and Bruner (1971) compared the effectiveness of an EM reinforcement procedure with that of a complex SM procedure (discussed subsequently). The EM procedure involved contracting with subjects to receive returned portions of previously deposited money contingent upon weekly weight loss. Thirty-two overweight male and female subjects were randomly assigned to one of three conditions: attention-placebo (the experimenter listened passively to problems concerning dieting and weight loss), self-management, and contingency contracting. Due to the fact that a very large portion of the attention-placebo and contingency contracting subjects dropped out of the study prematurely (75% and 58%, respectively), interpretation of the results is clearly problematic (probable self-selection confounding). The authors reported, nevertheless, that both the contracting and SM groups had lost a significantly larger portion of their initial excess weight than had the placebo group, at the end of 12 weeks of treatment, and that the contract group had lost a

significantly larger portion of their initial excess weight than had the SM group. At a 10-month follow-up, however, all significant differences in weight loss had disappeared.

Mann (1972) employed a single-subject design to assess the effect of EM reinforcement using subject-surrendered valuables. The subjects could either earn back or lose permanently these items contingent upon reaching contracted goals for short-term, intermediate, and long-term weight loss. The subjects in the study included seven obese women and two obese men, ranging in age from 18 to 33. At post-treatment (treatment duration was variable), five of the subjects had achieved their long-term weight loss goals, and the remaining three subjects had achieved from 40% to 70% of their long-term goals. Two subjects terminated prematurely, and no follow-up was completed. Mann's experimental design strongly suggests the efficacy of this reinforcement procedure, at least while the target contingencies are in effect, although attention-placebo and method of weight loss variables were not controlled or evaluated.

Despite the several methodological flaws in the research concerning EM reinforcement for weight loss, the cumulative thrust of the available evidence appears to support a claim of therapeutic efficacy, at least with reference to weight loss achieved while the reinforcement contingencies are in effect. This type of procedure seems to be of potential benefit in both inpatient and outpatient settings, although the possibility of consistent application and other related controls is obviously greater in the former setting.

SM Procedures

SM packages

Ferster, Nurnberger and Levitt (1962) introduced a set of techniques which, taken together, represented the prototype of most subsequent SM packages for the modification of obesity. Using a basic operant model, these authors conceptualized excessive eating leading to obesity as a function of several variables, including stimulus control, automatic response chaining, lack of prepotent behaviors competing with eating, lack of immediate awareness of aversive consequences, and periodic food deprivation. They developed a SM program that emphasized enhancing awareness of aversive consequences of overeating and moving them closer to the act of eating itself. They also suggested procedures for modifying the eating behavior itself, enhancing the subject's stimulus control, weakening automatic response chains leading to eating, developing a repertoire of prepotent behaviors, and eliminating periodic food deprivation.

Although Ferster and his co-workers applied these SM procedures in treating ten obese females, the results obtained, though promising, were apparently less than spectacular (Penick, Fillion, Fox and Stunkard, 1971). Reportedly, consequent weight change in these subjects varied from +5 lbs. to -20 lbs. with a mode of -10 lbs. (unknown treatment duration). The unique value of this work did not reside, however, in the data generated, but in its stimulation of subsequent clinical application and experimental investigation.

Stuart (1967) published the first subsequent report of a systematic application of a modified version of the SM program developed by Ferster et al. (1962). Stuart's regimen utilized extensive food consumption and body weight records and emphasized four behavioral procedures: direct modification of eating behavior itself (e.g., via meal interruption and consumption pace regulation), removal of problematic food cues from the subject's environment, reduction of extraneous environmental cues associated with eating, and development of high probability behaviors as substitutes for eating. In more abstract terminology, this program emphasized weakening automatic response chains leading to eating, enhancement of stimulus control, and development of a prepotent behavioral repertoire.

Stuart utilized these procedures with eight obese women ranging in age from 24 to 43 years and in weight from 172 to 224 lbs. At the date of the report, weight losses had ranged from 26 to 46 lbs. with a range in number of sessions from 16 to 41 (over a period of 12 months). As noted in the previous subsection, covert sensitization was applied, with reported success, in the cases of two subjects who had difficulty in regulating consumption of certain food items.

Harris (1969) completed the first experimental investigation of a typical SM package. Twenty four obese men and women (each at least 15 lbs. overweight) were randomly assigned to one of three groups: two SM procedure groups and one no-treatment control group. The subjects in both SM groups received instruction in calorie counting, self-reinforcement, stimulus control, direct modification of behavior chains involved in eating, and relaxation training. At the end of ten

weeks of group training in these procedures, the subjects in one SM group received from one to three individual covert sensitization sessions, while the subjects in the other SM group continued group discussions of the SM procedures. At four months from the beginning of SM training, both experimental groups had lost significantly more weight than the control group had lost, although, the former groups were not significantly different. These results indicate an important therapeutic effect for the SM package involved, at least while treatment was in effect.

Wollersheim (1970) conducted an experimental investigation of SM procedures which, by the methodological standards that typify much of the research in this area, was clearly superior. Both attention-placebo and experimenter variables, factors which have remained largely uncontrolled and unaccounted for in many similar experiments, were either controlled or experimentally assessed in this study. Wollersheim randomly assigned 79 overweight female college students (all at least 10% overweight; median overweight-28%) to one of four conditions: no-treatment control, social pressure (TOPS-type group meetings), nonspecific insight therapy, and SM procedures (focal treatment). In addition to relaxation, calorie estimation, and food-intake monitoring, several SM techniques were taught in the focal condition: building positive associations concerning eating control, developing appropriate stimulus control of eating behavior, manipulation of deprivation and satiation by shaping and fading, rewarding oneself for developing self-control of eating, developing and using personally meaningful ultimate aversive consequences of overeating, obtaining reinforcers from areas

of life other than eating, utilization of behavior chaining, and use of aversive imagery techniques.

Treatment procedures in the three experimental conditions were implemented during ten group sessions over a period of 12 weeks. At posttreatment, all three experimental groups had shown weight losses (residual gain scores) which were significantly greater than that shown by the no-treatment control group, but the focal condition (SM group) showed a significantly greater weight loss than either of the other two treatment conditions. Although all three treatment groups showed small weight gains at the 8-week follow-up, the significant differences shown formerly were maintained. The SM group also showed significantly greater improvements than the other three groups, at posttreatment, in four eating behavior factors measured by the Eating Patterns Questionnaire: emotional and uncontrolled eating, eating in isolation, eating as reward, and between-meal eating. At follow-up, the SM group was significantly superior to the other groups only with respect to reduction of eating in isolation. Pretreatment measures taken to predict response to treatment all proved nonsignificant.

Wollersheim's findings appear to unequivocally demonstrate the relative efficacy of group-learned, complex SM procedures in treating obesity, on a short-term basis—at least for populations of highly motivated, well-educated, relatively young, moderately obese, female subjects. With regard to the specificity of Wollersheim's subject sample, the putative effectiveness of most psychotherapeutic procedures with the YAVIS patient (Schofield, 1964) is brought to mind. This consideration and the failure to gather long-term follow-up data

(a serious short-coming, in view of the weight gains shown at the 8-week follow-up), appear to be the only attention-worthy flaws in an otherwise well-designed study-

Hagen (1970, 1974) completed experimental investigations which were essentially extensions of Wollersheim's (1970) earlier study. Hagen assigned 90 female subjects (descriptively similar to Wollersheim's sample) to one of four conditions: self-instruction manual plus written communication of SM principles and feedback, manual plus group contact, group contact only (Wollersheim's focal SM group), and no-treatment control. All SM procedures utilized by Wollersheim, except relaxation training, were both programmed into the self-instruction manual and taught verbally in the contact group conditions. Experimenter effects were assessed, in these investigations, but attention-placebo factors were not (on the argument that these had been adequately assessed in Wollersheim's previous study). The contact groups met weekly for 11 weeks and the manual-only group received 10 correspondence lessons during the same interval.

At posttreatment, weight loss did not differ significantly among the three treatment groups, although all of these groups differed significantly from the no-treatment control group. Mean weight changes, at posttreatment, varied from -10.5 lbs. to -13.3 lbs. for the three treatment groups, and that for the no-treatment control group was +.11 lb. These relative differences were maintained at a 4-week follow-up.

Hagen's findings appeared to have some practical significance, since they demonstrated the possibility of effective modification of

obesity via primary reliance on self-instruction with written materials, Reservations about this conclusion stem from the sample specificity discussed with respect to Wollersheim's (1970) study. Also, the long-term effectiveness of these procedures still remains indeterminate, since, once again, the necessary follow-up data were not obtained.

Using a cross-over, single-subject design, Stuart (1971) tested the therapeutic effects of a SM package consisting of three general dimensions: (a) behavioral procedures designed to enhance stimulus control of the food environment, alter undesirable elements of the eating behavior itself, and favorably modify reinforcement contingencies associated with eating; (b) an individualized dietary restriction program based on a convenient food exchange system; and (c) an individualized physical exercise program based on known caloric expenditure values.

Six obese women (171-212 lbs., 27-41 yrs. of age) were randomly assigned to one of two cohorts and were treated on an individual basis. All subjects completed a 5-week weight and food intake baseline record and took the Sixteen Personality Factor Questionnaire (16PF). The subjects in one cohort were given treatment twice weekly (40 min. sessions) for 15 weeks, while those in the second cohort were given diet planning materials, an exercise program and asked to practice "self-control" for this period of time. At the end of the first 15-week treatment period, conditions were reversed for both cohorts and a second 15-week treatment period was completed. Follow-up data were obtained on weight change, eating patterns, and

readministration of the 16PF, at three months and six months after treatment termination of the first and second cohorts, respectively.

Stuart's report of the results appears confusing: "Patients in Group 1 lost an average of 35 lbs., while those in Group 2 lost an average of 21 lbs. These results are consistent with the objective set for gradual weight loss approximating 1 lb. per week" (pp. 183-184). From the description presented, one might assume that the reported weight loss figures refer only to the results obtained for each group while actively engaged in their respective 15-week treatment regimens (Stuart later referred to the superior results of the first group). Comparison of pretest and posttest 16PF results showed improvements in the "ego stability" and "tension" factors for both groups. Stuart concluded that these results constitute "suggestive evidence" of the efficacy of his three-dimensional program. He acknowledged that the sample size was too small, however, such that the degree of generalization of the results was yet unknown.

Penick, Filion, Fox and Stunkard (1971) compared a combined SM-EM regimen with a more conventional group therapy treatment. The SM-EM condition involved the use of food intake monitoring, enhancement of the subject's stimulus control over the food environment, development of techniques to directly modify undesirable aspects of eating behavior, and reinforcement of specified SM behaviors and actual weight loss via an experimenter-controlled point system (which used money as a back-up reinforcer). The group therapy condition utilized supportive techniques and diet-nutritional instruction. A therapist was assigned to each condition whose training and orientation presumably allowed

him to be enthusiastic about and competent with the specific procedures he employed.

Thirty-two markedly obese males and females (all at least 20% overweight, ages 15-61) were randomly assigned to one of four groups, two groups per treatment condition. All groups met weekly for a period of 12 weeks, and weight measures were taken at follow-up, between three and six months after posttreatment. The method of reporting the results from this study was somewhat unconventional and confusing. At follow-up, the SM-EM groups had shown mean weight losses as follows: more than 40 lbs.-27%; more than 30 lbs.-40%; and, more than 20 lbs.-53%. The figures for the group therapy groups were: more than 40 lbs.-12%; more than 30 lbs.-18%; and, more than 20 lbs.-29%. The difference between treatment conditions was significant at the 30 lb. level, but not at either the 20 lb. or 40 lb. levels. Although the authors accepted the superiority of the SM-EM behavioral condition, on the basis of this data, failure to utilize more commonly accepted methods of data reporting and analysis renders these results somewhat ambiguous.

Jeffrey, Christensen and Pappas (1973) reported the development of a complex treatment program which emphasized contingency contracting for weight loss, but included several SM procedures, such as self-monitoring and self-reinforcement, as well. It was reported that this program was evaluated experimentally by assigning 43 adult university students and staff (degree of obesity not reported) to one of three conditions: behavioral treatment, "willpower," and no-treatment

control. The behavioral treatment subjects were seen once weekly for 45 minutes in a group session and once weekly for five minutes in an individual session, for a period of 18 weeks. The "willpower" subjects were reportedly given the same instructions as the behavioral treatment subjects but were not seen in group or individual sessions after the first meeting with a therapist. The method of assigning subjects to the treatment groups was not reported, and information concerning the qualifications and assignment of therapists was not supplied.

Reportedly, the behavioral treatment group lost significantly more weight at posttreatment than the "willpower" and control groups. Mean weight losses reported for the behavioral treatment, "willpower," and control groups were 16.39 lbs., 5.09 lbs., and 1.70 lbs., respectively. A 12-week follow-up was done, and no significant differences had occurred since posttreatment. No follow-up was completed for the "willpower" and control groups. Unfortunately, both the extremely sketchy character of the description provided and the several apparent methodological short-comings of the study (e.g., lack of general comparability between behavioral treatment and "willpower" procedures and failure to complete an adequate follow-up) preclude any acceptable interpretation of the data reported.

J- Balch and Ross (1974) compared the effects of a complex SM program with those of partial treatment and no-treatment control conditions. The SM program was based primarily on the model presented by Stuart and Davis (1972a), and each subject in the full treatment and

partial treatment conditions was required to purchase a copy of the SM manual Slim Chance in a Fat World (Stuart and Davis, 1972b), The SM procedures specified in this manual and presented didactically in the full-treatment condition were essentially identical to those used by Stuart (1971).

The subjects were 24 females ranging in age from 21 to 63 years, in weight from 127 to 277 lbs., and in degree of overweight from 4.8% to 145.1%. The mean degree of overweight was 35.3%. These subjects were "assigned" to treatment groups on a self-selection basis. The full-treatment group consisted of 19 subjects who completed at least 75% of the nine weekly group sessions. The partial-treatment group consisted of 15 subjects who completed from two to six group meetings. The no-treatment control subjects included eleven who elected to not participate in the treatment program due to schedule conflicts. ANOVA on pretreatment weights and pretreatment degree of obesity showed no significant differences among the three groups, in terms of these variables.

At posttreatment, t-tests between group means showed that the full-treatment subjects had lost significantly more weight than either the partial-treatment or no-treatment control subjects. Average weight losses, at posttreatment, for the full-treatment, partial-treatment, and control groups were 10.6 lbs., 2.7 lbs., and 1.2 lbs., respectively. ANOVA on posttreatment percentage of body weight lost showed similar results. There were no significant differences between the partial treatment and control groups. Statistical comparisons were

not done on the weight loss measures taken at the 6-week follow-up, but it was reported that the full-treatment group lost an average of 3.3 lbs., in the period from posttreatment to follow-up.

It is clear that the results of this study are quite ambiguous because of several methodological flaws. Self-selection biasing between groups was probably present. This alone could have accounted for the results obtained. Most importantly, the relatively short-term follow-up completed (and the manner in which it was done) was insufficient to support the authors' contention that the full-treatment subjects "had acquired the knowledge and skills necessary for successful weight control " (p, 242).

Foreyt and Parks (1975) reported the application of a SM package in the treatment of obesity in three severely retarded adults. The procedures utilized were adapted from the program developed by Stuart and Davis (1972a) and included an instruction manual for the subjects' parents, use of colored tokens representing various food groups, EM monetary reinforcement of weight loss, and daily weighing. All subjects were women. One was 36 years old, weighed 243 lbs., and had an I.Q. of 26. The second was 19 years old, weighed 161 lbs., and had an I.Q. of 35. The third was 21 years old, weighed 126 lbs., and had an I.Q. of 30. The colored tokens were used to help the subjects develop awareness of consumption levels in several food groups, and each subject was rewarded at the rate of 50¢ for each weekly loss of one lb. or more. Treatment lasted for a period of 11 weeks, and follow-up weight measures were taken for an additional 29 weeks.

The results showed an average weight loss of 8.5 lbs. for the 11-week treatment period and 15.2 lbs, for the 29-week follow-up period. Subject 1 lost 10 lbs. and 21.5 lbs., during these periods, respectively; subject 2 lost 11 lbs. and 18.75 lbs.; and, subject 3 lost 4.5 lbs. and 5,75 lbs. It was reported that these subjects eventually began to exercise partial self-control over specific eating behaviors (e.g., they reduced their consumption of high-calorie snacks) without the availability of immediate EM reinforcement. They also learned to verbalize some of the key requirements of weight loss.

Although this case study did not involve experimental controls, the results constitute suggestive evidence that severely retarded persons can benefit from a weight control program involving certain simplified SM procedures and EM reinforcement. One significant feature of the study is that a comparatively long-term follow-up indicated moderate but continued weight loss. The investigators suggested that the most important aspect of the program, in this regard, was the involvement of the subjects' parents via the written manual. They acknowledged, however, a further need for controlled research concerning the identification of the most effective program components.

Two studies have compared the relative effectiveness of complex SM procedures with that of EM procedures for weight control. The first of these (Harris and Bruner, 1971) was discussed previously, under the heading of experimenter-mediated reinforcement. The SM complex used in this investigation was essentially identical to that used by Harris (1969). As mentioned, when compared with an EM contracting procedure, the SM complex was found significantly less

effective in producing weight loss, at posttreatment, but significantly more effective than the placebo-control group, although all significant differences had disappeared at the 10-month follow-up. Inspection of the experimental procedures actually used showed that they were confounded with a variety of variables (e.g., erratic treatment implementation and poor subject attendance). Acceptable interpretation of these results is, consequently, virtually impossible.

The second study of this type was completed by Hall (1972). Using a crossover, single-subject design. Hall assigned 12 obese women (all 10% overweight or more) to one of two conditions. Pretreatment baseline records were obtained for all subjects from the TOPS club to which they belonged, and all subjects kept daily records of weight and weight plus food intake for consecutive two-week periods, respectively, before initiation of treatment. The SM procedures included instruction in use of the Emotional Response Routine (Chapman and Smith, 1970—a procedure similar to Homme's covert conditioning), development of stimulus control, weakening of automatic behavior chains leading to overeating, and development of a prepotent repertoire of behaviors incompatible with eating. The EM procedures involved setting up a contract for weight loss with reinforcement delivered in the form of a \$20 subject-selected product (symbolizing, to the subject, his own weight loss).

In the first treatment group, SM procedures were utilized for five weeks, following completion of pretreatment monitoring, then EM procedures were applied for the next five weeks. This sequence was

reversed for the second treatment group. For both groups, SM procedures resulted in median weight changes of about -2.5 lbs., during the 5-week period they were in effect. The EM procedure resulted in median weight changes of -5.75 and -6.87 lbs., for the first and second groups, respectively, during its period of application. Statistical comparisons were not computed, but the author concluded that the EM procedure proved superior to the SM package, regardless of the order of presentation, and that the effects of the SM package were relatively negligible. She suggested that the comparatively poor showing of the SM procedures in this study may have been due, in part, to the relatively greater age of the subjects, the relatively short period of time that the SM procedures were in effect, or the idiosyncratic combination of SM procedures used.

As in the case of the research on EM reinforcement procedures, most of the investigations concerning SM packages are heir to one or more methodological faults. But, once again, the bulk of the available research evidence in this area indicates that this class of procedures can be applied effectively in the management of obesity, at least on a short-term basis. Reservations are in order, however, especially with regard to the question of long-term effects. Only one of the experimental investigations reported thus far, in this subsection, gathered follow-up data at points beyond six months from post-treatment. In fact, the evidence from short-term follow-ups has indicated deterioration in therapeutic effects or lack of continued therapeutic progress. The only study which included a follow-up

beyond six months, that reported by Harris and Bruner (1971), showed no significant positive results from the SM package involved at ten months after treatment termination. A second study, reported by Harris and Hallbauer (1973), which is reviewed below, showed statistically significant positive results for the SM package involved, at seven months after treatment termination, but the average weight losses produced were of minimal clinical significance.

The only published systematic investigations of the long-term effects of typical SM packages have been completed by S. M. Hall and her research associates. In the first of these, Hall (1973) reported a two-year follow-up on the experiment summarized above (Hall, 1972). At this assessment point, none of the subjects had reached their ideal weight (all had received instruction in complex SM procedures), and four of the nine subjects contacted had gained weight since post-treatment.

The second of Hall's systematic follow-up studies deserves a more extended summary, due to its comparatively superior methodology. Hall, Hall, Hanson and Borden (1974) completed an experiment in which the effects of a SM package were compared with those of a simple SM procedure (shaping bites of food per day), relaxation control, and no-treatment control. The SM package used in the first treatment condition was similar in content and mode of presentation to that utilized by Wollersheim (1970). The simple SM procedure used in the second condition was essentially identical to that introduced by Shulman (1971) and Fowler, Fordyce, Boyd and Massock (1972). This

precedure involved simply shaping number of mouthfuls of food per day-
The studies alluded to above are reviewed subsequently.

The subject sample utilized in this study was uncommon, in that 51 of the 94 subjects were members of an urban community (median age-42 years, median percentage overweight-52%), while the other 43 were university students (median age-20.8 years, median percentage overweight-32%). Thus, the sample involved was more heterogeneous than those employed in many previous studies. These subjects were assigned randomly, from each group separately, to one of the four experimental conditions. Subjects in each of the three treatment conditions met weekly for ten weeks, with one of four therapists, in groups of five to seven persons. All subjects received identical booklets containing information on dieting and nutrition.

At posttreatment, statistical analyses were completed to test for significant differences in percent of body weight lost. The total number of subjects had dropped by 16, at this point, but the frequency of premature termination was not significantly different among treatment groups. The results showed that the subjects in both SM treatment conditions had lost significantly more weight, on the average, than either control group, but there were no significant differences between the groups of either pair. Therapist and therapist x treatment effects were assessed and found nonsignificant. At three-months follow-up, the effects of the three treatment conditions only were compared, and both SM conditions were still significantly different from each other. At six-months follow-up, however, the three treatment were no longer

significantly different. Both SM treatment groups had shown significant weight gains from posttreatment to six-months follow-up. Analysis of covariance (initial weight held constant) of treatment x population effects showed no significant differences between university and community populations, at any assessment period.

As Hall et al. noted, "The most important finding was the failure of self-management treatments to produce maintenance or continued weight loss " (p. 784). The authors further pointed out that both SM treatments produced very similar results, and they suggested that the effects of both may have been partially due to the presence of experimental demands while the treatments were in effect. More precisely, the demand characteristics of the experimental situation apparently motivated application of the SM procedures learned, while the subjects remained in this situation. Questioning of the subjects in both SM conditions, at the three-month follow-up, revealed that virtually all of the complex SM subjects and about 75% of the simple SM subjects had stopped practicing the procedures they had learned previously- The authors noted that the SM procedures are apparently effective, if applied, and they concluded that the conditions of which continued application is a function are crucial but, as yet, unknown.

A final reservation concerning the utility of SM packages should also be noted. Many of the more favorable treatment results for SM packages have been generated with experimental samples consisting largely of highly-motivated, well-educated, moderately obese. White, middle-class, female subjects (e.g., Wollersheim, 1970; Hagen, 1970,

1974). Some of the more variable results have come from studies involving subjects more heterogeneously distributed on these variables (e.g., Penick et al., 1971; Hall, 1972). One recent investigation (Weisenberg and Fray, 1974) has shown, in fact, that standard SM packages may not be effective in treating obese persons from some minority ethnic or socioeconomic groups. Although other evidence has appeared recently which suggests that complex SM procedures can be applied effectively, on a short-term basis, in some traditionally refractory or problematic populations (e.g., Hall et al., 1974; Foreyt and Parks, 1975), it is clear that this is one area in which additional, carefully controlled research is required.

SM package components

Six experimental investigations have been completed in which components of common SM packages have been evaluated. Harris and Hallbauer (1973) completed a study in which the contribution of physical exercise to a complex SM-EM program was evaluated. Thirty-five females and 11 males, ranging in age from 14 to 50 years and in weight from 119 to 295 lbs., were assigned, on a partially random basis, to one of three conditions: (a) self-control/contract, (b) self-control/contract/exercise, and (c) attention-placebo control. The SM and contract procedures used in the first two groups were essentially identical to those employed by Harris and Bruner (1971). In the second group, subjects were given information concerning estimation of the caloric expenditure value of various daily and recreational

activities and were encouraged to commit themselves to a daily exercise program. One experimenter served as the therapist in all three groups, and the subjects in each condition were seen weekly in group sessions for a period of 12 weeks.

Although 20 subjects were initially assigned to the first group, 22 to the second, and 14 to the third, only 11, 10, and 6 remained in these groups, respectively, at posttreatment. Differences between group means (lbs. lost) were not significant at posttreatment, although they were significant at seven-months follow-up. At the latter point, both behavioral treatment groups had lost significantly more weight than the attention-placebo group, and the second treatment group (exercise) had lost significantly more than the first treatment group. The mean weight changes for the first through the third groups were, respectively, -6.9, -9.1, and -6.8 lbs., at posttreatment, and -8.8, -13.1, and +0.2 lbs., at follow-up. Although the authors concluded that both behavioral treatment conditions had resulted in weight loss maintenance superior to that of the attention-placebo condition, it is clear, as mentioned previously, that the average weight losses demonstrated are not particularly encouraging, in view of the period of time involved.

As in the case of the studies reported by Harris and Bruner (1971), the results of the foregoing investigation are difficult to interpret. Two notable methodological flaws are apparent. First, self-selection biasing of the subject sample is probable, in view of the fact that more than 50% of the subjects who began treatment dropped

out before the program was terminated. Second, the degree to which the subjects in the second group implemented suggestions concerning physical exercise was uncontrolled and unknown.

A second SM package component study was published by Mahoney, Moura and Wade (1973). In this study, 53 obese males and females were randomly assigned to one of five conditions: (a) self-reward, (b) self-punishment, (c) self-reward plus self-punishment, (d) self-monitoring, and (e) information-control. Self-reward and self-punishment in the first three groups were implemented via subject-deposited money. The primary procedure in the fourth group was monitoring of food intake and weight change. All groups received the same information concerning the stimulus control of eating. Treatment for all experimental groups lasted for a period of four weeks.

At posttreatment, the self-reward group had lost significantly more weight than either the self-monitoring or information-control groups, but did not differ significantly from the self-punishment and self-reward plus self-punishment groups. Posttreatment weight changes for the first through the fifth groups were -6.4, -3.7, -5.2, -0.8, and -1.4 lbs., respectively. At four-months follow-up, the self-reward and self-reward plus self-punishment groups were significantly different than the control group, in terms of percentage of overweight lost. In terms of proportion of body weight lost, these two groups were also significantly different from the self-punishment group. Follow-up weight changes for the first through fifth groups were -11.5, -7.3, -12.0, -4.5 and -3.2 lbs., respectively. The data from this study

suggests that the self-reinforcement procedure may be the most uniquely effective of those tested.

Mahoney (1974) conducted a similar experimental study in which 49 obese adult subjects were randomly assigned to one of four conditions: (a) self-reward for weight loss, (b) self-reward for habit improvement, (c) self-monitoring, and (d) delayed treatment control. As in the previous study, all subjects in the first three conditions were given the same basic information concerning the stimulus control of eating, and all subjects utilized self-monitoring of food intake and weight change. Self-reward was implemented via subject-deposited funds, as before. All subjects in the three experimental groups participated in the same baseline monitoring for two weeks prior to treatment initiation. At this point, weight loss and habit change goals were set for all subjects, and the first and second groups began self-reinforcement procedures.

The results showed that weight losses during the two-week baseline period were relatively small and inconsistent, and weight change for the self-monitoring group, even after the initiation of weight-loss and habit change goals, remained insignificant. [^]When self-reinforcement procedures were implemented in the first two groups, however, substantial and significant weight losses were observed for these groups, although the second group (self-reward for habit improvement) demonstrated significantly greater weight loss than the first group (self-reward for weight loss). Again, the individual procedure of self-reward appeared most effective, and its being made contingent

upon habit improvement, rather than upon weight loss itself, seemed still more promising.

In the most ambitious research project of its kind to date, Romanczyk, Tracy and Thorpe (1973) utilized a sequential dismantling strategy to compare the effects of several popular SM package components. Two experiments were conducted. In the first of these, 102 obese subjects (ages 18-55, all greater than 15 lbs. overweight) agreed to attend five group treatment sessions (one per week) and to make a \$10 deposit refundable upon satisfactory attendance. These subjects were randomly assigned to one of seven experimental conditions: (a) no-treatment control; (b) daily weight self-monitoring; (c) daily weight and caloric intake self-monitoring; (d) self-monitoring and symbolic aversion (covert sensitization); (e) self-monitoring, symbolic aversion and relaxation; (f) self-monitoring, symbolic aversion, relaxation, and behavioral management and stimulus control instructions (Stuart, 1967, 1971); and, (g) self-monitoring, symbolic aversion, relaxation, behavioral management and stimulus control instructions, and contingency contracting. All treatment conditions were run for four consecutive weeks.

The results of this experiment showed no significant differences in weight loss between groups a and b or among groups c, d, e, f, and g. However, weight loss for groups c-g was significantly greater than that for groups a and b. This data indicates, then, that daily weight recording alone was not effective in producing significant weight loss and that the other five treatment conditions were apparently equally

effective. The authors stated that daily self-monitoring of caloric intake and weight change, alone and in the absence of therapist contact, can effect significant weight loss in obese persons. They noted that these results are in conflict with those obtained by Stuart (1971), Mahoney et al, (1973), and Mahoney (1974), and they suggested that the differences may be due to the more precise food intake measure (caloric value) used in this investigation. They also suggested that the lack of progressive weight loss with progressive addition of SM procedures may have been due to lack of significant diet change or to the relatively short treatment period utilized. One interesting non-focal result in this study was that only the group given the full set of SM procedures (g) had no premature drop-outs.

The second experiment was designed to test the hypothesis that a full complement of SM procedures might result in weight loss maintenance superior to that produced by the self-monitoring procedures alone. In this experiment, 60 obese subjects (similar to those in the first experiment) were randomly assigned to one of two treatment conditions: (a) information, self-monitoring, and relaxation; and (b) information, self-monitoring, relaxation, behavioral management and stimulus control instructions, and symbolic aversion. As before, the duration of the study was four weeks (primary treatment phase). Unexpectedly, attrition was a problem for both groups in this experiment: more than one third of each dropped out prematurely.

The results of the second study showed some interesting effects. The weight loss results for the first group closely resembled those for group c in the previous study—supporting the indication that

monitoring of caloric intake and weight loss, alone can be effective in modifying obesity. However, the second group showed significantly greater weight loss than the first group, at posttreatment and the three- and twelve-week follow-ups. Further, while treatment effects of weight loss were maintained for both groups at the follow-up assessments, the effects for the second group appeared to be accelerating through the follow-up period. These results appear to indicate overall superiority for the full-treatment package. Although the authors concluded that these findings are encouraging with regard to long-standing difficulties in achieving enduring weight losses, in the treatment of obesity, the follow-up period was much too short.

Bellack, Rozensky and Schwartz (1974) compared the effects of two types of self-monitoring as components of a SM package similar to that used by Stuart (1971). On the basis of the theoretical analysis of self-control behavior presented by Kanfer and Karoly (1972), Bellack et al. suggested that self-monitoring may be a key component of self-management in weight control. Further, they hypothesized that the specific temporal relationship between self-monitoring and eating behaviors may represent a critical variable in this component. They suggested that self-monitoring which occurs between stimulation to eat and actual eating would enhance self-control significantly more than self-monitoring which occurs after eating had taken place. Inattention to this temporal variable, they argued, may have been responsible for the failure of some investigators to demonstrate significant therapeutic effects for self-monitoring procedures in weight control (e.g., Mahoney et al., 1973; Mahoney, 1974).

To test their focal hypothesis, Bellack et al. randomly assigned 32 women and five men (mean age—31,9 yrs., mean weight—156.2 lbs.) to one of four experimental conditions: (a) premonitoring (P,M,), (b) postmonitoring (Pt.M,), (c) nonmonitoring (N,M.) and (d) waiting list controls (W,L,). Two graduate students in clinical psychology served as co-therapists for the three treatment groups, and the core SM program, mentioned above, was taught in the same manner to each of these groups. All groups met for seven weekly sessions.

The results involving percentage of body weight lost showed that only the P.M. group had lost significantly more weight, at posttreatment, than the W.L. group. The other group differences were non-significant, at this point. At six-weeks follow-up, both the P.M. and N.M. groups had lost significantly more weight than either the Pt.M. or W.L. groups, although the members of each pair did not differ significantly. None of the demographic and personality variables measured at pretreatment (e.g., age, level of education, locus of control, and anxiety level) correlated significantly with weight change measures, at either posttreatment or follow-up.

The investigators concluded that the overall results indicated support for the research hypothesis, but that the source of the predicted difference was not what had been expected. They suggested that, instead of the P.M. procedure enhancing the long-term effectiveness of the core SM program, the Pt.M. procedure apparently reduced its effectiveness. Unfortunately, failure to complete a follow-up of longer duration vitiates this conclusion with regard to genuinely long-term effects.

Romanczyk (1974) reported an experiment concerning the effects of self-monitoring in weight control that was essentially a replication of the first experiment reported by Romanczyk et al, (1973). Fewer subjects (70) were used, however, and the original seven treatment conditions were condensed into five. Like Bellack et al, (1974), Romanczyk focused his research problem on Kanfer's hypothesis concerning the key role of self-monitoring in self-control behavior (Kanfer, 1970). But, the parameters of self-monitoring Romanczyk chose to investigate, in this experiment, were different than those chosen by Bellack et al. As in the Romanczyk et al, (1973) experiment, the parameters investigated by Romanczyk (1974) were self-monitoring of weight loss and self-monitoring of caloric intake.

Weight loss results, in the latter experiment, at the end of four weeks treatment, were essentially the same as those of the former experiment. Self-monitoring of daily weight alone was shown comparatively ineffective in producing weight loss, during treatment, while self-monitoring of caloric intake was shown almost as effective as a composite of SM procedures. Overall differences between caloric self-monitoring and complex SM groups were nonsignificant, at posttreatment, but a trend toward greater loss of larger portions of excess weight in the complex SM groups was evident. Also, as in the previous experiment, the effects of caloric self-monitoring and complex SM procedures were found to be nonadditive. The previously mentioned "floor effect" hypothesis was again invoked to explain this result.

Unfortunately, follow-up comparisons between caloric self-monitoring and the complex SM conditions were not done in this experiment. Consequently, the long-term effectiveness of this particular self-monitoring procedure is still relatively indeterminate. In addition, the period of active treatment (four weeks) was so brief that the relative maximum impact of the SM package employed may not have been achieved (i.e., the subjects may not have learned all relevant SM procedures or received adequate reinforcement for their appropriate application).

Single SM techniques

A number of experiments have been completed which have tested single SM procedures against control procedures or have compared the effects of single SM procedures. In the first of these, Tyler and Straughan (1970) compared the effect of Homme's (1965, 1966) covert control procedure with that of breath holding, using 57 obese female subjects (all TOPS members). The covert control procedure involved the subject's practicing a sequence of covert and overt behaviors, such that low probability thoughts incompatible with eating are reinforced by high probability overt behaviors (Premack's principle applied to cognitive events). The breath holding procedure involved completing this behavior contingent upon the occurrence of subjectively felt temptations to overeat. At the end of nine weeks of treatment, weight changes for covert, breath holding, and control groups were $-.75$, $-.43$, and $+.53$ lb., respectively (none were significant). It is clear that these results do not indicate much practical utility for the focal techniques.

Horan and Johnson (1971) compared two forms of covert control with no-treatment control and placebo procedures. One covert condition was incomplete in that the subjects were instructed to simply think positive and negative covert pairs without consequating this with high probability overt behaviors. The other covert control condition utilized the full procedure. Ninety-six obese college females were randomly assigned to one of four conditions, and treatment was conducted for eight weeks. The results showed weight loss for the full-procedure covert condition to be significantly greater than that for the no-treatment control group, but differences between the full-procedure covert group and the other groups were nonsignificant. In all conditions, the average weight loss per week was fairly small, in comparison to that often achieved with SM packages.

Horan, Baker, Hoffman and Shute (1975) reported an experiment in which the effects of negative covert control were compared to those of positive covert control in the treatment of obesity. Horan et al. stated briefly the difference between these two types of covert control: "Negative coverts deal with the aversive aspects of being overweight. Positive coverts focus on the desirable attributes of being properly proportioned " (p, 68). One purpose of the study was to determine whether Homme's (1965) paradigm could be shortened to include three components instead of four. Other variables of interest in Homme's paradigm were food vs. nonfood reinforcement of coverts and group vs, individual counseling modalities.

Forty overweight females (degree of obesity not reported) were randomly assigned to one of eight treatment conditions in a 2 X 2 X 2

matrix. As indicated, three independent variables were varied dichotomously: (a) positive vs. negative coverant types, (b) food vs. nonfood reinforcement, and (c) group vs. individual counseling. All subjects were required to deposit \$20 at the beginning of the program, and this money was returned to them in gradually increased amounts contingent only upon continued participation in the eight-week treatment. All subjects also received a booklet which contained instructions in dieting and various SM techniques, and were seen by one of two counseling psychologists. The subjects in the individual counseling modality were seen for three half-hour sessions during the eight-week treatment period. Those in the group modality were seen for 55-minute sessions throughout the same period.

At posttreatment, ANOVA on percentage of body weight lost revealed a significant main effect for coverant type. In the authors' words, "The use of positive coverants, regardless of counseling mode or highly probable behavior type, produced considerably more weight loss than did negative coverants " (p. 70). It was noted that 75% of the subjects in the positive coverant conditions lost at least one lb. per week, during the treatment period, while only 35% of the subjects in the negative coverant conditions did so. No other significant main effects or significant interactions were obtained.

Although this investigation appears to demonstrate more clearly positive effects for one variant of coverant control, in the treatment of obesity, its comparative effectiveness, with regard to other commonly used SM procedures, remains relatively indeterminate. Common methodological short-comings present in this study partially preclude

an adequate interpretation of the results, as well. Adequate attention-placebo conditions were not included (e.g., that utilized by Foreyt and Hagan, 1973), and no follow-up data were collected. One can only conclude that the specific coverant control technique involving only positive coverants might make a useful contribution to a broader treatment program, although the extent of the contribution is yet unknown. This conclusion was, in fact, drawn by Horan et al., although they subsequently proceeded to speak of the technique in considerably more positive terms. At a minimum, additional carefully controlled research is needed to validate the present claim of unique value for this procedure.

Shulman (1971) compared a self-shaping procedure (aimed at gradually decreasing the number of mouthfuls of food per day and increasing total eating time) with placebo and no-treatment control conditions. Thirty-six obese, male and female college students were randomly assigned to one of these three conditions, and the subjects in the self-shaping group met individually with the experimenter for ten weekly treatment sessions. The results showed significantly greater weight loss and changes in percentage of body weight for the focal treatment condition, both at posttreatment and at six-months follow-up. The fact that weight loss results for the self-shaping condition in this study were only slightly inferior to the average results reported with many SM packages, together with similar results reported by Fowler, Fordyce, Boyd and Masock (1972) and Hall et al. (1974), suggests that this technique may be of some benefit as one component of an effective

SM package. Procedures similar to this have already been used, in fact, as one component of such SM packages (e.g., Stuart and Davis, 1972a, 1972b).

Kessler (1974) examined the effect of a "mutual help" technique on weight reduction. She assigned 18 obese subjects randomly to one of three conditions: (a) no-treatment control, (b) SM package and group therapy, and (c) SM package, group therapy and mutual help. The mutual help technique, in this case, involved telephoning an assigned partner at moments when tempted to eat in response to negative emotional arousal. The SM procedures utilized included several introduced by Ferster et al. (1962). The treatment groups met for six weekly sessions. At posttreatment, weight loss for both groups b and c was significantly greater than that for the control group, but the former groups did not themselves differ significantly. The author concluded that the SM learning procedures used were effective but that the mutual help technique made no difference with respect to treatment outcome.

Jeffrey (1974) completed the only study thus far which has compared the effects of SM reinforcement to those of EM reinforcement. The subjects in this experiment were 62 obese men and women ranging in age from 21 to 60 yrs. (mean-39 yrs.) and in percentage overweight from 12 to 79% (mean-42%). All had previously made one or more unsuccessful attempts at weight loss. These subjects were randomly assigned to one of three treatment conditions: (a) EM reinforcement with nonrefundable contingency, (b) SM reinforcement with refundable contingency, and (c) SM reinforcement with nonrefundable contingency.

All subjects were required to deposit \$35 with their therapist during the first of seven individual treatment sessions. They were informed that they could earn back portions of this money via contingencies involving weight loss and/or change in eating habits. In the EM condition, the experimenter alone controlled the delivery of monetary reinforcement with regard to the specified contingencies, while the subject alone controlled the delivery of reinforcement in the SM conditions. The difference between the two SM conditions was that the portion of the \$35 deposit which had not been delivered via the specified contingencies would be refunded to the subjects at the end of the program, in the SM-refundable condition, but not in the SM-nonrefundable condition. All subjects in the three conditions received identical manuals, which contained instruction in several SM procedures for weight control (similar to those utilized by Wollersheim, 1970 and Stuart, 1971). They were also given and instructed to use daily weight graphs and eating habit record forms. The therapists were three undergraduate students who had been trained in the treatment procedures used but not informed concerning the research hypothesis under investigation. They were monitored by the experimenters throughout their administration of individual treatment sessions, to ensure uniformity in application of the treatment procedures.

On the basis of Kanfer's (1971) theoretical analysis of the variables involved in self-control of behavior, Jeffrey predicted that EM and SM conditions would result in equally significant weight losses, at posttreatment, but that the SM conditions would show superior weight

maintenance. The results of this study supported these predictions. The average weekly weight loss, during the seven weeks of treatment, was .7 lb, for the SM condition and .9 lb. for the combined SM conditions. There was no significant difference between the groups at posttreatment, but, unlike the two SM groups, the EM group showed a significant weight gain at the six-week follow-up.

Jeffrey concluded that EM and SM reinforcement are equally effective in producing weight loss, but that SM reinforcement is superior in achieving long-term maintenance of weight loss. Although the first part of this conclusion is consistent with the evidence available from other studies, the entire conclusion is questionable, in light of the methodological weaknesses in this study. The main treatment conditions were confounded by suggestions made to subjects of probable therapeutic effect, and the follow-up period was too short to determine long-term differential effects of any clinical significance. The data displayed by Jeffrey showed, in fact, that the SM group did not continue to lose weight from posttreatment to follow-up. This fact, in addition to evidence from other investigations of SM procedures involving longer-term follow-up periods (e.g., Hall, 1973) vitiates his conclusion of differential effects in weight loss maintenance.

Summary

Like the previous major section, but to an obviously greater degree, the present major section has been long, and the studies reviewed have been varied and complex. Once again, it is appropriate

to provide a concise summary of the salient research results discussed, before proceeding to the final two major sections of this chapter. As before, the primary points of this section are set forth below in a list format.

1. The traditional treatment of obesity, emphasizing medically supervised diet regimens, has proven largely ineffective in meeting the therapeutic needs of the vast majority of obese persons.

2. Of five contemporary nonbehavioral therapies discussed, (hypnosis, psychodynamic psychotherapy, family therapy, drug therapy, and bypass surgery), there is no systematic experimental evidence indicating that these are appropriate for general use in treating obesity. However, there are persuasive arguments, based on clinical experience, that specifiable variants of individual psychodynamic psychotherapy may be differentially indicated for persons whose eating disturbances are related to developmental deficits in personality or the presence of neurotic emotional conflicts. Further, there is heuristic evidence that a family system model of therapeutic intervention might be useful, at least in cases of developmental obesity- Finally, there is some clinical evidence that bypass surgery is uniquely indicated and moderately effective in cases of massive, long-term obesity.

3. Behavioral treatments of obesity were developed largely in response to the failure of the traditional medical approach. Behavioral treatment techniques have been divided into Experimenter-Managed (EM) procedures and Self-Managed (SM) procedures, depending upon who maintains primary control over the procedure and reinforcement contingencies involved.

4. The EM procedures which have received some attention in the research literature can be divided, according to known short-term effectiveness, thus: (a) relatively effective procedures—EM material reinforcement, especially in a contract paradigm; (b) relatively ineffective procedures—covert sensitization; and (c) procedures of indeterminate effectiveness—aversive conditioning via electric shock or unpleasant odors, and induced anxiety (1A).

5. A number of SM packages, based largely on a prototype introduced by Ferster et al. (1962), have been developed and experimentally tested. Standard SM packages commonly include techniques which are designed to (a) bring into immediate awareness the consequences of overeating, (b) modify the eating behavior itself, (c) enhance the subject's control of relevant stimuli, (d) weaken automatic response chains leading to eating, (e) develop a repertoire of prepotent behaviors incompatible with eating, (f) eliminate periodic food deprivation, (g) provide more immediate feedback concerning consumption levels, and (h) increase the subject's control over nonfood reinforcers.

In general, when compared with no-treatment, attention-placebo, and conventional group psychotherapy conditions, these SM packages have been shown relatively effective in generating weight loss, on a short-term basis. The results of one study showed that SM package procedures can be implemented effectively by obese persons working solely on the basis of a self-instruction manual and written communication. The generality of these results may be restricted, however, to a population consisting of relatively young, motivated, well-educated, White, moderately obese, female subjects, although two or

three studies have shown substantial short-term therapeutic effects with traditionally refractory populations.

6. Some research has been done concerning the relative effectiveness of SM package components and single SM procedures. On the basis of the results reported, the techniques involved can be divided, according to known short-term effectiveness, thus: (a) relatively effective procedures—SM material reinforcement, especially when made contingent upon habit improvement, and shaping of mouthfuls and total eating time per day; (b) relatively ineffective procedures—self-punishment, daily weight monitoring alone, "mutual help," contingent breath holding, and Homme's full coverant control procedure; and, (c) procedures of indeterminate effectiveness—self-monitoring of caloric intake and weight change, positive coverant control, and any single SM package technique not proven effective alone.

7. Although SM packages and some individual SM and EM procedures have been shown relatively effective in generating weight loss, on a short-term basis, there is currently little experimental evidence indicating significant positive clinical results for periods beyond six months after posttreatment.

In fact, the evidence from short-term follow-up has indicated deterioration in therapeutic effects or lack of therapeutic progress. Further, two systematic studies involving long-term effects showed that self-management treatments have failed to produce maintenance or continued weight loss.

Current Research Needs

From a clinical perspective, the primary function of a valid theory of any disorder is to make available effective procedures of treatment and prevention. On the basis of the deterministic assumptions of a scientific approach, the failure of specific treatment methods implies one or a combination of two conditions: (a) inadequate or incomplete theory of the disorder, or (b) inadequate or incomplete treatment procedures.

Reciprocally, the possession of (a) a valid and complete theory of a disorder along with (b) complete treatment procedures based explicitly on the theory necessarily results in therapeutic and preventative success, given favorable boundary conditions. Symbolically, this can be expressed thus: A plus B implies C; if C is false, then A plus B cannot be true.

On the basis of the evidence reviewed in the foregoing pages, C is false. No single treatment procedure or combination of treatment procedures developed thus far has been demonstrated, on a systematically empirical basis, to be of lasting therapeutic benefit to any specifiable subclass of obese persons. This conclusion was drawn independently by Stunkard (1975, p. 1653), one of the most knowledgeable scientist-clinicians in the field. The short-term effects demonstrated by some behavioral treatment procedures seem to be of little significant clinical consequence, since they are rarely maintained after six months from treatment. This state of affairs implies that A plus B cannot be true: (a) the theory of obesity is inadequate

or incomplete and/or (b) the treatment procedures are inadequate or incomplete. It is necessary to review each of these possibilities in order to determine the areas of greatest weakness and, therefore, the areas most in need of empirical research.

It is clear that there are several areas of inadequacy or incompleteness in the theory of obesity. Concerning the developmental-psychological dimension, no systematic, empirically validated schema has been developed which effectively differentiates between the obese and the nonobese or differentiates subclasses of obese persons. Bruch's (1940, 1973) analysis addresses the needs in this area far more than others, but most of her concepts remain empirically unvalidated. The primary failure here is not a lack of theoretical formulations, but a lack of empirical validation. Concerning the behavioral dimension, there does exist a fairly systematic, empirical analysis of the behavioral features which reliably differentiate the obese, as a group, from the nonobese. However, there are two areas of significant weakness in this dimension of analysis: (a) lack of empirical differentiation of subclasses of obese persons, and (b) lack of empirical analysis of behavioral areas other than eating itself. Finally, concerning the family system dimension, it is clear that no empirically validated schema has been developed which reliably differentiates subclasses of obese persons or differentiates between obese persons and nonobese persons. Again, Bruch's (1940) clinical work in this area was seminal but remains empirically unvalidated.

It is also clear that there are several areas of inadequacy or incompleteness in the development or application of treatment

procedures. The weakness in this area is not that a sufficient range of procedures is unavailable. Indeed, a perusal of the therapeutic literature reveals that the set of therapeutic procedures available is virtually exhaustive. Rather, treatment procedures are generally selected unsystematically and without detailed reference to a thorough, empirically validated theory of obesity. Even in the research involving behavioral procedures, little attention has been paid to the probable existence of potent individual or subclass differences. Consequently, there is no systematic understanding of for whom and under what conditions specific behavioral procedures may be therapeutically appropriate. This observation is also valid concerning individual psychotherapy and family therapy procedures. In both domains, many specific procedures have been developed, but there is no body of empirical knowledge that might systematically indicate the differential application of such procedures in obesity treatment. This weakness is especially prominent regarding family therapy procedures, since they have not been applied in the treatment of obesity even on a trial-and-error basis.

This analysis implies that the primary need in obesity research is for empirical validation of a basic theory of obesity with specific reference to individual and subgroup differences in psychological-developmental, behavioral and family system factors. On the basis of the literature reviewed in this chapter, it appears that the order of greatest research need is this: (a) family system factors, (b) psychological-developmental factors, and (c) behavioral factors. Ranking family system factors first is based on the comparative lack

of research and the potential explanatory-therapeutic power suggested by family system research in other psychosomatic syndromes. Ranking psychological-developmental factors second is based on the presence of much confusion and a corresponding lack of empirical validation of the primary explanatory concepts discussed in the literature. Ranking behavioral factors third is based on the existence of considerable research in this area, but a significant need for investigation of individual and subclass differences. It is assumed, in this context, that further differentiation according to behavioral factors should await development of systematic concepts concerning psychological-developmental and family system factors. The premise underlying this assumption is that differences in overt behavior are interpretable only in the context of verified differences in psychological-developmental and family-environmental factors. The converse seems true, as well, and this emphasizes the contextual, multi-level nature of the explanative problem.

The Present Investigation

As mentioned previously, Minuchin's family system model of psychosomatic illness in children involves primary factors which appear to be in basic correspondence with the central explanatory variables identified in Bruch's (1940) clinical study of the families of obese children. It was pointed out, however, that the explanatory significance of these variables has not been corroborated by systematic empirical research, primarily because there have been virtually no other empirical studies in this area. It was suggested that the empirical

validation of Minuchin's model in the development of obesity would make available a potentially useful approach to treatment based on family system intervention. It is also apparent that empirical validation of the model would make available new concepts and procedures for primary prevention. Family system determinants of obesity could be identified early in a child's life by pediatrician and other health or mental health professionals. Finally, it is apparent that empirical validation of the model or some modification of it, for various subclasses of obesity, would provide significant explanatory information concerning post-therapeutic failures and the future selection of differentially appropriate therapeutic interventions.

In the context of these observations and the foregoing discussion of current research needs, the primary purpose of the present investigation, which is described in greater detail in the following chapter, was to carry out an initial empirical test of the applicability of Minuchin's family system model to the families of obese children. Since the model subsumes the primary explanatory concepts derived in Bruch's (1940) clinical study, an empirical test of the validity of these basic concepts is encompassed by the primary purpose. Two important aspects of the primary purpose were (a) to test the generalizability of the concepts to a special subpopulation, and (b) to assess family system variables not directly implied by Minuchin's model.

More specifically, the family system factors of (a) enmeshment, (b) overprotectiveness, (c) rigidity, and (d) lack of conflict

resolution were considered of primary interest. It was hypothesized that a sample of families with obese children would show significantly higher measures of these variables than a control sample of families with "normal" nonobese, nonpsychosomatic, nonpsychiatric children. In addition, several other dimensions of family functioning were measured and analyzed in terms of their significance in discriminating the obese families from the nonobese families.

Through measuring a wide range of family system variables, it was also hoped that a smaller set of variable measures would emerge which, together, could predict differential responsiveness to the best treatment procedures currently available for obesity in children. Further, it was hoped that a subset of such measures would emerge which could be identified as determinants of the degree of obesity developed in children. To these ends, the relationship between each family system measure and the percent overweight and two dimensions of response to a broadly-based therapeutic program were assessed for the subjects in the experimental group.

Concerning subject selection, a decision was made to target children between the ages of 6 and 16 years of age who developed obesity prior to the onset of pubescence. This decision was made with reference to two considerations: (a) the family of origin system would be intact and influential; and, (b) the history of obesity would be fairly apparent and stable. Such a sample represents, with some reservations, a subpopulation of families with a fair probability of showing the family system characteristics of Bruch's clinical analysis. This

selection effect was considered appropriate, however, since the present investigation represents a first attempt to test the validity of a conceptual model that was derived from other significantly deviant subpopulations. Further, it was recognized that there is no "average" obese child and family and that it was better to account for as many parameters of deviance as possible, rather than to trust they would be "neutralized" statistically or experimentally.

CHAPTER II

METHOD

As indicated in the previous chapter, the primary purpose of the present investigation was to test the applicability of Minuchin's (1975) family system model to families of obese children. A second purpose was to examine such families in terms of other family system factors not directly implied by the model. A third purpose was to determine whether any of the family system measures used in the present study could account for a significant portion of outcome variance in an ongoing treatment program. It is now appropriate to specify further the variables of principal interest, before variable measures are discussed. As defined originally, each of these variables has multiple manifestations on an operational or denotative level. As such, they represent the type of "generalized, even abstract concepts" which Bruch (1973, p, 74) and other investigators consider necessary in a comparative study of family systems at the present time.

Variable Definitions

The first family system variable of Minuchin's (1975) model was termed "enmeshment." Several manifestations, many of which appear overlapping, were identified (p. 1033): *{(a) a high degree of inter-personal involvement and intrusion^ (b) constant undermining of individual autonomy or independence, \ (c) a lack of privacy and the*

occurrence of excessive "togetherness," (d) a lack of individual separateness in communication patterns, (e) poor differentiation between perception of self and perception of other family members, and (f) poorly defined and easily crossed subsystem boundaries—common occurrence of parent-child coalitions and role confusion— The present author concluded that a lack of individual independence and confusion in role boundaries appear predominant in defining the variable.

The second family system variable was termed "overprotectiveness." The manifestations identified included: (a) constant attempts among family members to elicit nurturant and protective responses, (b) structuring of interpersonal perceptions, in the family, predominantly around protective concerns, (c) excessive restriction of the child's social and recreational involvements and a consequent undermining of competence in these areas, and (d) excessive concern, on the part of the symptomatic child, for the welfare of the total family. The present author concluded that a preoccupation with protective concerns and undermining of competence in social and recreational activities seem predominant.

The third family system variable was termed "rigidity." The manifestations discussed by Minuchin were: (a) a heavy investment in maintaining the status quo in transactional patterns already established in the family system, (b) unusual resistance to change demanded by individual development (e.g., a child's entry into adolescence), (c) repetitive focus of family attention on the symptomatic child as a primary mechanism of avoiding change, (d) self-presentation by the family as normal and untroubled, except for the symptomatic child's

medical problem, and (e) denial of any need for change in the family system. The present author concluded that resistance to change of established transactional rules and denial of family problems or need for change appear predominant.

The final primary variable in Minuchin's model was termed "lack of conflict resolution." The manifestations of this variable included: (a) general intolerance for explicit recognition of interpersonal conflicts or differences, (b) constant threat or emergence of conflict among family members, (c) frequent adoption of a systematic mechanism for suppressing family conflict, such as a strong religious or ethical code, and (d) repeated failure to negotiate mutually satisfactory solutions to family problems. The present author concluded that chronic, but unacknowledged threat of conflict among family members and lack of explicit negotiation of such conflicts are predominant.

Two primary variables were identified for measurement and analysis in the treatment outcome part of the present study. The first of these was the number of treatment sessions attended by each mother-child pair prior to termination from the treatment program. It was assumed that this measure reflected the relative degree of a family's commitment to the treatment effort. The second variable was the number of pounds of body weight lost by the child during each family's involvement in the treatment program. Since the treatment outcome aspect of the present study was instituted several months after the group comparison aspect was under way, the author concluded that these two measures of response to treatment were the only methodologically feasible and clinically meaningful ones available.

Variable Measures

A number of problems were evident in the task of selecting variable measures for the present investigation. The first and most important problem was to select measures which validly and reliably reflect significant manifestations of the variables in question. If the measures selected did not reflect all the manifestations of the variables, it was important that the most salient aspects be reflected. A second problem was the need for standardization of measures in order to ensure comparability of research results for the purpose of replication and comparative analysis. This need seemed especially critical in the domain of family system research, which is yet relatively embryonic. A third problem was the need for multiple measures of the same phenomena. This need relates partially to the validity issue, but primarily to the recognition that the meaning of measurement results is invariably technique- or perspective-centered. Given the nature of the present subject matter, it seemed useful to compile measures which reflect self-observation, experimenter-observation, "naturalistic" description and "experimental" manipulation. Finally, there was the problem of selecting measures that would both solve important aspects of the foregoing problems and be subject to relatively powerful statistical techniques for hypothesis testing. Given the reality of practical limits on subject availability in this area, interval- or ratio-scale data would allow use of parametric techniques and, consequently, smaller sample sizes.

With the foregoing problems in mind, the present investigator surveyed the available literature concerning empirical measurement of

family system variables (e.g., Riskin and Faunce, 1972). A number of the measurement methods that emerged from this inquiry were rejected because of their inability to solve one or more of the foregoing problems (e.g., Riskin and Faunce, 1969; Strodbeck, 1951; van der Veen, 1969). In the end, two scales designed to measure family system variables were selected: (a) the Family Environment Scale (Moos, 1974) and (b) the Beavers-Timberlawn Family Evaluation Scale (Lewis, Beavers, Gossett and Phillips, 1976). These instruments are discussed below in terms of a general description and the research needs specified above.

The Family Environment Scale (FES) is a "paper-and-pencil" technique which is designed to be self-administered by each literate family member. It consists of 90 statements about family life which are to be designated true or false. On the basis of prior theoretical and empirical analyses, the 90 items were grouped into 10 subscales, each involving 9 items. Each subscale reflects a relatively independent dimension of family life, but they are organized conceptually into three subgroups: (a) Relationship Dimensions—Cohesion, Expressiveness, and Conflict; (b) Personal Growth Dimensions—Independence, Achievement Orientation, and Moral-Religious Orientation; and (c) System Maintenance Dimensions—Organization, and Control. Statistical measures concerning item-subscale correlations and retest reliability were computed (Moos, 1974, pp. 6-7). The item-subscale correlations ranged from .45 to .58, and the retest reliability correlations ranged from .68 to .86. Subscale means and standard deviations, for a normative

sample, and standard score conversions for subscale raw scores are available. On the basis of combined subscale scores, a Family Profile can be constructed. The FES can also be completed on the family by an investigator, and differences in perception of family structure can be measured systematically.

The Beavers-Timberlawn Family Evaluation Scale (BT) is a rating technique designed to be utilized by independent observers with tape recorded or live family interaction material. It consists of 14 rating subscales organized into five general areas of family structure or process, and there is one rating subscale of "global health-pathology." The subscales were derived from a thorough comparative theoretical analysis of family functioning in relation to individual personality development. The five general areas of family functioning and their respective subscales are: (a) Structure of the Family—Overt Power, Parental Coalitions, Closeness, and Clarity of Power Structure; (b) Perception of Reality—Reality Congruence of Family Mythology; (c) Task Efficiency—Efficiency of Negotiations and Problem Solving; (d) Autonomy—Communication of Self-Concepts, Responsibility, Invasiveness, and Permeability; and (e) Family Affect--Expressiveness, Mood and Tone, Conflict, and Empathy. Each subscale is constructed on a 5-point equal-interval scale that reflects judgments concerning the "degree of pathology" in the designated area. A high score on five of the subscales (Power, Parental Coalitions, Closeness, Invasiveness, and Global Health-Pathology) reflects a relatively "positive" adjustment on the corresponding dimensions, while high scores on the other

nine subscales reflect a relatively "negative" adjustment. Lewis et al. reported subscale interrater reliabilities in the range of .17 to .82 for trained and experienced investigators. Eleven of the subscale reliabilities reported were .60 or higher. All subscales were positively and significantly correlated with the Global Health-Pathology scale, although there was a small amount of overlapping variance between some subscales (p. 93). An extensive comparative study was conducted by the authors concerning the validity of subscales in discriminating among families with normal, neurotic, behavior disorder and psychotic adolescent members. All subscales discriminated between normal families and families in each of the other categories (p. 95). The validity of each subscale in discriminating among the "pathological" families was quite variable, although differences were more significant when families at the relative extremes were compared.

On the basis of the foregoing discussion, it is apparent that the present need for reliable, standardized, multiple, and interval-scale measures is relatively well satisfied by the techniques selected. To complete the analysis in this subsection, it is necessary to specify how it was assumed that the subscales of these techniques would correspond to the significant manifestations of the variables in question. Each variable and corresponding subscale are considered below. One may observe that some correspondence is hypothesized between a single subscale and more than one variable. This, of course, implies some overlap in the various manifestations of the different variables.

Concerning the variable of enmeshment, specific manifestations were hypothesized in the FES subscales of Cohesion and Independence. The dimension of Cohesion is defined by Moos (1974) as "The extent to which family members are concerned and committed to the family and the degree to which they are helpful and supportive to each other." It was assumed that a high degree of togetherness and involvement, two manifestations of enmeshment, would be reflected by a high score on the Cohesion subscale. The dimension of Independence is defined as, "The extent to which family members are encouraged to be assertive, self-sufficient, to make their own decisions and to think things out for themselves " (p. 4). It was assumed that a lack of "independence" or "autonomy" would be reflected in a low score on the Independence subscale. Specific manifestations were also hypothesized in the BT subscales of Closeness, Communication of Self-Concept, Responsibility and Invasiveness. The dimension of Closeness is defined by Lewis et al. (1976, p. 85) as, "The presence or absence of distinct boundaries between individuals in a family and the degree of closeness." It was assumed that a confusion in role boundaries and a high degree of involvement would be reflected in a low score on the Closeness subscale. The dimension of Communication of Self-Concept is defined as, "The degree to which the family nourishes or discourages the clear communication of feelings and thoughts " (p. 87). The dimension of Responsibility is defined as, "The degree to which the family system reflected family members' acceptance of responsibility for their own thoughts, feelings and actions " (p. 87). It was assumed that poor differentiation between perception of self and perception of other

family members would be reflected in high scores on the Communication of Self-Concept subscale and the Responsibility subscale. The dimension of Invasiveness is defined as, "The extent to which a family system tolerated or encouraged family members to speak for one another " (p. 88). It was assumed that poor differentiation between perception of self and perception of other family members and a lack of individual separateness in communication patterns would be reflected in a low score on the Invasiveness subscale.

Concerning the variable of overprotectiveness, specific manifestations were hypothesized in the FES subscales of Active-Recreational Orientation, Cohesion and Independence. The dimension of Active-Recreational Orientation is defined by Moos (1974) as, "The extent to which the family participates actively in various recreational and sporting activities " (p. 4). It was assumed that excessive restriction of a child's social and recreational involvements would be reflected by a low score on the Active-Recreational Orientation subscale. It was also assumed that preoccupation with protective and nurturant concerns would be reflected by a low score on the Independence subscale and a high score on the Cohesion subscale, as these were defined previously. No specific manifestations of overprotectiveness were hypothesized for the BT subscales.

Concerning the variable of rigidity, specific manifestations were hypothesized in the FES subscales of Conflict and Control. The dimension of Conflict is defined as, "The extent to which the open expression of anger and aggression and generally conflictual interactions are characteristic of the family " (p. 4). It was assumed that

denial of family problems and any need for change would be reflected in a low score on the Conflict subscale derived from subject-generated data. The dimension of Control is defined as, "The extent to which the family is organized in a hierarchical manner, the rigidity of rules and procedures, and the extent to which family members order each other around " (p. 4). It was assumed that resistance to change of established transactional rules would be reflected in a high score on the Control subscale. Specific manifestations of rigidity were also hypothesized in the BT subscales of Overt Power and Mythology. The dimension of Overt Power is defined as the degree to which family transactions are controlled or dominated by family members and the extent to which negotiation and flexibility characterize the process. It was assumed that a heavy investment in maintaining the status quo and unusual resistance to change would be reflected in a relatively low score on the Overt Power subscale. The dimension of Mythology is defined as, "The degree to which the family's concept of how it functions as a group seems congruent with reality " (p. 36). It was assumed that a family's presentation of itself as normal and untroubled and in no need of change would be reflected in a relatively high score on the Mythology subscale.

Concerning the variable of lack of conflict resolution, specific manifestations were hypothesized in the FES subscales of Conflict, Expressiveness and Moral-Religious Orientation. As defined previously, a relatively low score on the Conflict subscale, derived from subject-generated data, would be expected in correspondence to a family's general intolerance for explicit recognition of interpersonal conflicts

or differences. The dimension of Expressiveness is defined as, "The extent to which family members are allowed and encouraged to act openly and to express their feelings directly " (Moos, 1974, p.4). It was assumed that the presence of constant threat of conflict among family members would be reflected in a relatively low score on the Expressiveness subscale. The dimension of Moral-Religious Orientation is defined as, "The extent which the family actively discusses and emphasizes ethical and religious issues and values " (p. 4). It was assumed that a family's adoption of a systematic mechanism for suppressing family conflict, such as a strong religious or ethical code, would be reflected in a relatively high score on the Moral-Religious Orientation subscale. Specific manifestations of lack of conflict resolution were also hypothesized in the BT subscales of Conflict, Expressiveness and Goal-Directed Negotiation. The Conflict dimension is defined as, "The frequency of unresolved conflict between family members and the degree to which it impairs group functioning " (p. 90). The Expressiveness dimension is defined as, "The degree to which the family system is characterized by open expression of feelings." The Goal-Directed Negotiation dimension is defined as, "The degree of effectiveness in negotiation and problem-solving " (p. 86), It was assumed that a constant threat of conflict among family members and repeated failure to negotiate mutually satisfactory solutions to family problems would be reflected in relatively low ratings on the Conflict subscale, relatively high ratings on the Expressiveness subscale and relatively high ratings on the Goal-Directed Negotiation subscale.

Statistical Hypotheses and Tests

As stipulated in the previous chapter, the present investigation involved a systematic, empirical comparison between families with obese children (EF) and families with only nonobese children (CF). It was hypothesized that a sample of EF would show significantly higher measures on the primary variables in Minuchin's (1975) family system model than a sample of CF. The variables and variable measures of primary interest were specified in the preceding section.

On the basis of the foregoing description of research hypotheses and variable measures, precise directional hypotheses were defined in statistical terms. These are specified below and reflected in Tables 1-3. In all cases, the designation "significant" refers to a 2-tail significance level of .05, although all hypotheses were directional.

Concerning the variable of enmeshment, six hypotheses of significant differences were defined. Two involve FES subscales: (a) Cohesion— $EF > CF$, and (b) Independence— $CF > EF$. Four involve BT subscales: (c) Closeness— $EF < CF$, (d) Communication of Self-Concept— $CF < EF$, (e) Responsibility— $CF < EF$, and (f) Invasiveness— $EF^* > CF$.

Concerning the variable of overprotectiveness, three hypotheses were defined, although only one of these is not redundant with any of the previous six. This hypothesis involves one FES subscale: (g) Active-Recreational Orientation— $CF > EF$. The other two hypotheses are identical with hypotheses (a) and (b) above. Concerning the variable of rigidity, four hypotheses were defined. Two involve FES subscales: (h) Conflict— $CF > EF$ (except FES-E data for which $EF > CF$ was hypothesized), and (i) Control— $EF > CF$. Two involve BT subscales:

(j) Overt Power—EF[>]CF, and (k) Mythology—CF[>]EF. Concerning the variable of lack of conflict resolution, six hypotheses were defined, although only five of these are not redundant with any of the previous 11 hypotheses. Two involve FES subscales: (l) Expressiveness—CF[>]EF, and (m) Moral-Religious Orientation—EF[>]CF. There involve BT subscales: (n) Expressiveness—CF[<]EF, (o) Goal-Directed Negotiation—CF[<]EF, and (p) Conflict—EF[<]CF. The other hypothesis is identical with hypothesis (h) above. One hypothesis concerning overall family adjustment was defined. This hypothesis specified CF[>]EF on the BT rating of Global Health-Pathology. Finally, as mentioned in the foregoing section, a significant positive correlation was expected between this general measure and the two outcome variables.

Thus, twenty-four group comparison hypotheses, in addition to several other comparisons completed on matching and remaining family system variable measures, were tested in a two-group design. Although only 17 statistical hypotheses are designated above, the seven FES subscale hypotheses were evaluated twice: once on the basis of family self report (FES-S) and once on the basis of investigator observation (FES-E). Only FES self-report scores from the mothers in EF and CF families were used, since it was found that fathers were often not available and the responses from children were frequently invalid and unreliable. The FES-E scores used for data analysis represent an average of the ratings generated by the author and research assistant in each instance.

Given that most of the data was at least interval-scale level, student's t-test for differences between group means was selected as

TABLE 1
 HYPOTHESIZED FES-S DIFFERENCES

Subscale	EF	CF
S-CSN	+	
S-EXPR		+
S-CONFL		+
S-INDEP		+
S-ACHIEV		
S-INTEL		
S-REC		+
S-MORAL	+	
S-ORG		
S-CNTRL	+	

TABLE 2
 HYPOTHESIZED FES-E DIFFERENCES

Subscale	EF	CF
E-CSN	+	
E-EXPR		+
E-CONFL	+	
E-INDEP		+
E-ACHIEV		
E-INTEL		
E-REC		+
E-MORAL	+	
E-ORG		
E-CNTRL	+	

TABLE 3

HYPOTHESIZED B-T DIFFERENCES

Svibscale	EF	CF
BT-POWER		+
BT-COAL		
BT-CLSN		+
BT-MYTH	+	
BT-NEGOT	+	
BT-SELF	+	
BT-RESP	+	
BT-INVAS		+
BT-PERM		
BT-EXPR	+	
BT-MOOD		
BT-CONFL		+
BT-EMPATHY		
BT-GLOBAL	+	

the appropriate statistical technique. Although the conventional .05 level of significance is referred to, in evaluating the hypotheses, actual levels of significance achieved and corresponding effect sizes (Cohen, 1977) are reported for each hypothesis test. Group comparisons using the data generated for the matching variables of race (RACE), socioeconomic status (SES), subject's sex (S SEX) and number of parents (# PNTS) were also completed, but the comparison results must be interpreted somewhat differently, since the data involved is only dichotomous in type. Since the question of overlapping variance in variable measures is also very important in a study of this type, discriminant functions were derived on the basis of the best predictors and additive variance. Pearson's product-moment correlation coefficient was computed between each family system measure and each outcome measure and percent overweight (determined from NCHS Growth Charts, 1976). In an attempt to further identify family system variables having significant independent predictive value for percent overweight and treatment outcome, stepwise multiple regression procedures were completed on the variable pairs previously subjected to correlational analysis. Finally, a factor analysis was completed with all family system variable measures together in an attempt to identify a smaller set of common family system factors. This group of statistical procedures was selected, on a step-by-step basis, to provide an optimal quantitative context for evaluating and integrating the many dimensions of the hypotheses in question. The sequence of test procedures is explained further in Chapter III. The method selected, in the present study.

for running the discriminant analysis program was that involving derivation of the greatest multivariate F ratio between the two groups. The method selected for the factor analysis involved a principal-component solution with orthogonal (varimax) rotation to terminal factors.

Subjects

There were three issues of primary importance in considering the question of subject selection for an investigation of this type. First, there was the problem of how many subjects should be selected for the experimental and control groups. Second, there was the issue of what criteria would be used in selecting EF subjects. Third, there was the issue of what criteria would be used in selecting the CF subjects. Each of these issues is discussed below.

In contemporary research planning, the need to select a number of subjects sufficient to provide a reasonably powerful test of the statistical hypotheses has received explicit recognition (Cohen, 1977). The task of selecting an appropriate number of subjects requires, however, some meaningful estimate of experimental effect size. In many areas of psychological research, such estimates are very difficult to establish. Unfortunately, this was the situation in the present area of research. Nevertheless, on the basis of the experimenter's several years of experience in working clinically with obese persons, some estimate of expected effect size was made using Cohen's (1977) guidelines. Accordingly, it was assumed that the effect size for some of the central variables would be in the "medium" to "large" range. This

assumption implied that the differences expected between EF and CF subjects would be of a magnitude that is "visible" to trained observers. This assumption was consistent with the experimenter's clinical experience with obese children and their families versus "normal" children and their families. Using Cohen's (1977) t-test power table, it was determined that a selection of 25 subjects for the EF group and 25 subjects for the CF group would generate acceptable power for each t-test: $p = .55$ to $p = .79$ (with effect size $d^{\wedge} = .60$ to $d. = .80$).

The issue of criteria for selecting EF subjects was most problematic. It has become apparent to the investigator, on the basis of several years of clinical experience, that families with obese children which best fit Bruch's (1940) observations rarely make themselves voluntarily available for empirical study or clinical remediation. Those that do make themselves voluntarily available tend to be "better adjusted" and less obese than the many others who do not. This appeared to be the situation for most of the obese children and their families that were available to the experimenter through Calories Anonymous (Choksi, Bower, Pollard and Mankad, 1977), a hospital-based outpatient treatment program for obese children at Mercy Hospital and Medical Center in Chicago. Nevertheless, subjects meeting the following criteria were available through the program and were included in the study: (a) at least 20% overweight, (b) between the ages of 6 and 16, (c) no history of psychiatric disturbances or treatment, and (d) no history of other psychosomatic disturbances. In all cases, the nuclear family unit was accessible to the experimenter for interview and evaluation. Unfortunately, random selection was not possible, since a larger

pool of subjects was not available. The EF subjects evaluated represented 25 consecutive patients who entered the Calories Anonymous (CA) program during 1978. The results of the investigation are interpreted with explicit recognition of the specificity of this sample.

The selection of CF subjects was also quite problematic. Given the nonrandom nature of the EF sample, it was necessary to select a CF sample on the basis of matching for some variables and exclusion for other variables. To insure rough comparability, CF subjects were matched, as closely as possible, with EF subjects on the basis of (a) socioeconomic status, (b) family size, (c) the subject's age, sex and sibling position, (d) racial group, and (e) presence of one or two parents in the home. Concerning the need to define "normality" in the CF sample, certain "negative" criteria were invoked and subjects were screened accordingly: (a) no history of psychiatric disturbances or treatment, (b) no history of psychosomatic disturbances, and (c) no history of obesity. Matching and screening of CF subjects on the basis of these variables was completed in an effort to control potent sources of variance, other than those measured, which might systematically influence dependent variable differences between EF and CF groups. Candidates for the EF group were referred to the author through the outpatient medical clinics of Mercy Hospital and by professional persons in the community-

Procedure

In the present study, all family assessments were completed on a home-visit basis. In family system research it is fairly standard

practice to complete family interviews in the subject's home (Riskin and Faunce, 1976). It has been a common impression that families are usually more comfortable and less defensive in revealing accurate information about themselves when they are interviewed in their natural home setting. In addition, physical access to the family's home environment yields a great deal of first-hand observational data about family structure and lifestyle that may not be disclosed in hospital or laboratory settings. Finally, it has been a common experience that the probability of having present all members of the nuclear family is substantially higher when interviews are conducted in the home. The fact that the research setting was variable and uncontrolled was considered insignificant, since it was assumed that the variation was not systematically biasing between the CF and EF groups.

All family assessments were completed through the collaborative effort of the author and a female assistant (hereafter referred to collectively as the investigators). This arrangement was considered desirable for two reasons. First, the author has found that the administrative and social aspects of conducting family interviews in the home generally proceed more smoothly and efficiently with a male-female team. This provides for a division of labor concerning many procedural details, and most families experience the team as a more comfortable social unit. Second, the independent assessment of family system variables by two observers was considered an integral aspect of the research design. This provided for an assessment of inter-observer reliability and presumably improved the validity of the investigator-completed measures.

In each family assessment, the same time interval (approximately 90 minutes) and sequence of procedures was observed. First, each literate family member was asked to complete the FES independently. Second, the parent or parents were asked to provide demographic information about the family- Third, the family was brought together to discuss and complete the Family Task, shown in Appendix 1. The Family Task was completed, in each case, without the presence of the investigators, who removed themselves to another room during this segment of the assessment. Fourth, the investigators joined the family again to complete the Structured Family Interview, shown in Appendix 2. During this segment, an effort was made to solicit active discussion of the interview questions by each family member. Fifth, the investigators completed their own FES and BT ratings of the family system, on the basis of reviewing a tape recording of the Family Task and Structured Family Interview. These ratings were completed independently immediately following each home-visit.

The outcome phase of the study was completed using all of the subjects evaluated in the EF group. As noted previously, these subjects represented 25 consecutive patients who entered the CA program during 1978. Each EF was evaluated prior to entry into the CA program. During the evaluation interviews, the nature of the program was fully explained and a date of entry was arranged. Thereafter, it was each family's responsibility to initiate and maintain its own participation in the program. Mothers were asked to attend group meetings with their children, but this rule was frequently ignored.

The CA treatment program itself was a multifaceted educational and group counseling effort based on the most effective documented obesity treatment techniques. The program was designed and staffed by the present author and several other health care professionals, including a pediatrician, dietician, medical social worker, occupational therapist and physical therapist. Upon entry into the program, each EF subject was thoroughly oriented to basic principles of nutrition and use of a food exchange system. Each obese child was assigned daily caloric intake limits based on body weight and the explicit goal of losing an average of one pound per week. The group process itself was oriented around two primary foci: (a) ongoing education and discussion of essential topics in nutrition, exercise, behavior modification (SM) and family problems related to weight loss efforts, and (b) a monetary reinforcement (EM) system that rewarded each child according to a graduated schedule based on completion of specified SM procedures (group attendance, food intake record keeping, exercise and weight loss). The program was open-ended, although new EF subjects were generally inducted in groups of three or more. All treatment outcome results were recorded in January, 1979 and encompass the one-year period of research and treatment which began in January, 1978.

To conclude this section, it seems useful to recall the previous statement concerning the present need to compile measures which reflect self-observation, investigator-observation, "naturalistic" description and "experimental" manipulation. On the basis of the foregoing description, it should be fairly clear that all of these dimensions were integrated into the assessment procedures. Although the "naturalistic"

and "experimental" dimensions of assessment were not reflected separately in the investigator-completed measures, it was assumed that this is not necessarily a flaw in the research design. The present investigation represents a first systematic, empirical attempt to define family system variables that effectively discriminate the families of obese children from "normal" families. At this level of inquiry, it seemed that a "pure" experimental manipulation would probably have been poorly aimed and failed to yield the multiple-variable, higher-level conceptual analysis that, in the author's opinion, was presently needed.

CHAPTER III

RESULTS

Group Comparisons

Matching Variables

A list of variable measure names, abbreviations, value ranges and value meanings used in the present chapter is presented in Table 4. Appendixes 4 and 5 display the raw score values generated for each subject family evaluated. The same subject numbers in these appendixes refer to matched subjects. Table 7 shows the group means (X), standard deviations (S.D.), t.-test statistics (T), degrees of freedom (D.F.) and significance levels (S) for each matching variable. For the variables RACE, SES, S SEX and # PNT, the statistical values do not have the conventional meaning, since these variables were measured dichotomously (nominal data). Nevertheless, the tabled values do show that matching was absolute on RACE, SES and S SEX, while it was not absolute but very high on # CHLDRN, S AGE, S POS and # PNT. The X values indicate that the EF families were 88% Blacks, 44% lower class, 66% middle class, had an average of 2.6 children and had 56% single-parent homes. The EF subjects (obese patients) had an average sibling position of 1.68, an average age of 11.6 years and were 80% females. The X values indicate that the CF families were 88% Blacks, 44% lower class, 66% middle class, had an average of 2.64 children and had 54% single-parent homes. The

TABLE 4
MEASURE ABBREVIATIONS AND VALUES

Scales and Variable Measures	Measure Abbreviations	Value Range	Value Meaning
<u>Matching</u>			
Subject Number	SUBJ #	1-25	Literal
Race	RACE	0, 1	0 = White 1 = Black
Socioeconomic Status	SES	0, 1	0 = Middle 1 = Lower
Number of Children	# CHLDRN	1-5	Literal
Subject's Age	S AGE	7-16	Literal
Subject's Sex	S SEX	0, 1	0 = Male 1 = Female
Subject's Sibling Position	S POS	1-4	1 = First
Number of Parents Present	# PNT	1, 2	Literal
<u>Dependent Variables</u>			
Percent Overweight	% OVRWT	28-133	Literal
Number of Sessions	# SESS	0-25	Literal
Pounds Lost	LB LOST	0-36	Literal
<u>FES-S</u>			
Cohesion	S-CSN	1-9	9 = Very High
Expressiveness	S-EXPR	1-9	9 = Very High
Conflict	S-CONFL	1-9	9 = Very High
Independence	S-INDEP	1-9	9 = Very High
Achievement Orientation	S-ACHIEV	1-9	9 = Very High
Intellectual-Cultural Orientation	S-INTEL	1-9	9 = Very High
Active-Recreational Orientation	S-REC	1-9	9 = Very High
Moral-Religious Orientation	S-MORAL	1-9	9 = Very High
Organization	S-ORG	1-9	9 = Very High
Control	S-CNTRL	1-9	9 = Very High

TABLE 4-Continued

MEASURE ABBREVIATIONS AND VALUES

Scales and Variable Measures	Measure Abbreviations	Value Range	Value Meaning
FES-E			
Cohesion	E-CSN	1-9	9 = Very High
Expressiveness	E-EXPR	1-9	9 = Very High
Conflict	E-CONFL	1-9	9 = Very High
Independence	E-INDEP	1-9	9 = Very High
Achievement			
Orientation	E-ACHIEV	1-9	9 = Very High
Intellectual-Cultural			
Orientation	E-INTEL	1-9	9 = Very High
Active-Recreational			
Orientation	E-REC	1-9	9 = Very High
Moral-Religious			
Orientation	E-MORAL	1-9	9 = Very High
Organization	E-ORG	1-9	9 = Very High
Control	E-CNTRL	1-9	9 = Very High
BT			
Overt Power	BT-POWER	1-5	5 = Positive
Parental Coalition	BT-COAL	1-5	5 = Positive
Closeness	BT-CLSN	1-5	5 = Positive
Mythology	BT-MYTH	1-5	5 = Negative
Goal-Directed			
Negotiation	BT-NEGOT	1-5	5 = Negative
Communication of			
Self-Concept	BT-SELF	1-5	5 = Negative
Responsibility	BT-RESP	1-5	5 = Negative
Invasiveness	BT-INVAS	1-5	5 = Positive
Permeability	BT-PERM	1-5	5 = Negative
Expressiveness	BT-EXPR	1-5	5 = Negative
Mood and Tone	BT-MOOD	1-5	5 = Negative
Conflict	BT-CONFL	1-5	5 = Positive
Empathy	BT-EMPATHY	1-5	5 = Negative
Global			
Health-Pathology	BT-GLOBAL	1-8	8 = Negative

TABLE 5
MATCHING VARIABLES GROUP COMPARISONS

Variables	Groups	X	S.D.	T	D.F.	S
RACE	EF	.88	.33	.00	48	1.00
	CF	.88	.33			
SES	EF	.44	.51	.00	48	1.00
	CF	.44	.51			
# CHLDRN	EF	2.60	1.32	.11	48	.91
	CF	2.64	1.25			
S AGE	^^	11.10	1.11	.35	48	.73
	CF	11.30	2.72			
S SEX	^^	.80	.41	.00	48	1.00
	CF	.80	.41			
S POS	^^	1.60	.71	.35	48	.73
	CF	1.60	.71			
# PNT	^^	1.36	.49	-57	48	.57
	CF	1.36	.49			

CF subjects (matched children) had an average sibling position of 1.60, an average age of 11.3 years and were also 80% females.

Family System Variables

Tables 6-8 show the statistical results for the group comparisons on FES-S, FES-E and BT variable measures. Group means (X), standard deviations (S.D.), t-test statistics (T), degrees of freedom (D.F.) and significance levels (S) are given for each variable measure and have the conventional meaning. Two measures of effect size are also shown in these tables (Cohen, 1977). The primary effect size index (d) specifies the magnitude of differences between the group means in common standard deviation units. The secondary index (U) specifies the magnitude of group differences in terms of percent nonoverlap between the sample distributions. The differences between group means are also displayed graphically in Figures 1-3.

As indicated in Chapter II and reflected in Tables 1-3, twenty-four hypotheses of directional differences between groups on specific family system variable measures were stated. These hypothesized differences are identified again by an asterisk (*) in Tables 6-8, which show that twenty-one of them were confirmed. Tables 6-8 also show that nine out of ten remaining variable measures not specified in the research hypotheses yielded significant differences between the EF and CF groups. The d values generated for the group differences involved are in the large to extremely large range (.72-2.7). This suggests that the significance of the differences found is not marginal or a product of random variation, even though a large number of t.-tests

TABLE 6
FES-S GROUP COMPARISONS

Variable	Groups		S.D.		D.F.			U
S-CSN	EF	6.40	2.22	6.78	48	.000	1.90	80
	CF	2.52	1.81					
S-EXPR	EF	5.68	1.73	4.25	48	.000	1.20	63
	CF	7.48	1.23					
S-CONFL	EF	3.52	1.83	1.94	48	,059	.55	35
	CF	2.64	1.35					
S-INDEP	EF	6.16	1.46	4.89	48	,000	1.40	69
	CF	7.84	.90					
S-ACHIEV	EF	6.12	1.13	4.68	48	.000	1.30	66
	CF	7.56	1.04					
S-INTEL	EF	5.16	1.70	5.27	48	.000	1.50	72
	CF	7.32	1.15					
S-REC	EF	4, 24	2.52	5.30	48	,000	1.60	73
	CF	7, 28	1.37					
S-MORAL	EF	6.72	2.09	9.23	48	.000	2.70	90
	CF	2.16	1.31					
S-ORG	EF	5.84	1.99	,84	48	,404	24	15
	CF	5.44	1.29					
S-CNTRL	EF	5.40	1.29	21	48	.835	,06	
	CF	5.32	1.41					

TABLE 7
FES-E GROUP COMPARISONS

Variable	Groups	X	S.D.		D.F.			U.
E-CSN	EF	5.46	3.05	2.92	48	.005	.89	51
	CF	7.40	1.32					
E-EXPR	EF	3.18	2.21	7.70	48	.000	2.20	85
	CF	7.24	1.44					
E-CONFL	EF	6.12	2.30	7.36	48	.000	2.20	85
	CF	2.38	1.07					
E-INDEP	EF	3.38	2.11	8.57	48	.000	2.60	88
	CF	7.44	1.08					
E-ACHIEV	EF	5.54	2.27	4.31	48	.000	1.30	66
	CF	7.68	1.00					
E-INTEL	EF	2.56	2.42	8.82	48	.000	2.60	90
	CF	7.32	1.20					
E-REC	EF	3.50	3.22	6.00	48	.000	1.90	79
	CF	7.58	1.09					
E-MORAL	EF	6.92	1.97	9.12	48	.000	2.60	90
	CF	2.56	1.36					
E-ORG	EF	4.86	2.52	2.38	48	.022	.72	45
	CF	6.18	1.18					
E-CNTRL	EF	6.18	1.83	2.78	48	.008	.80	48
	CF	4.94	1.28					

TABLE 8
BT GROUP COMPARISONS

Variable	Groups	X	S.D.	T	D.F.	S	d	U ₁
BT-POWER	^^ CF	^^'^^ 4.08	-'^^ .59	4.18	48	.000	1.30	67
BT-COAL	^^ CF	^^'^^ 4.10	•'^^ .65	3.27	48	.002	.97	55
BT-CLSN	^^ CF	^^'?? 4.12	•'^^ .46	4.55	48	.000	1.40	69
BT-MYTH	^^ CF	^^'^^ 1.88	-'H .65	6.15	48	.000	1.80	77
BT-NEGOT	^^ CF	^^'^^ 2.12	'^^ .49	6.07	48	.000	1.80	77
BT-SELF	^^ CF	^^'^^ 2.08	•'^^ .59	5.25	48	.000	1.60	72
BT-RESP	^^ CF	^^'^^ 2.18	^^ .48	5.88	48	.000	1.80	76

TABLE 8-Continued
BT GROUP COMPARISONS

Variable	Groups	X	S.D.	T	D.F.	d	U,	
BT-INVAS	EF	2.72	1.08	4.81	48	.000	1.40	69
	CF	3.90	.58					
BT-PERM	EF	3.44	1.11	5.25	48	.000	1.60	73
	CF	2.18	.45					
BT-EXPR	EF	3.36	.98	5.45	48	.000	1.60	72
	CF	2.08	.64					
BT-MOOD	EF	2.66	1.11	3.49	48	.001	1.10	57
	CF	1.82	.48					
BT-CONFL	EF	2.88	.98	4.42	48	.000	1.40	67
	CF	3.82	.41					
BT-EMPATHY	EF	3.20	.91	4.95	48	.000	1.50	69
	CF	2.13	.48					
BT-GLOBAL	EF	6.00	2.01	6.98	48	.000	2.10	82
	CF	2.90	.95					

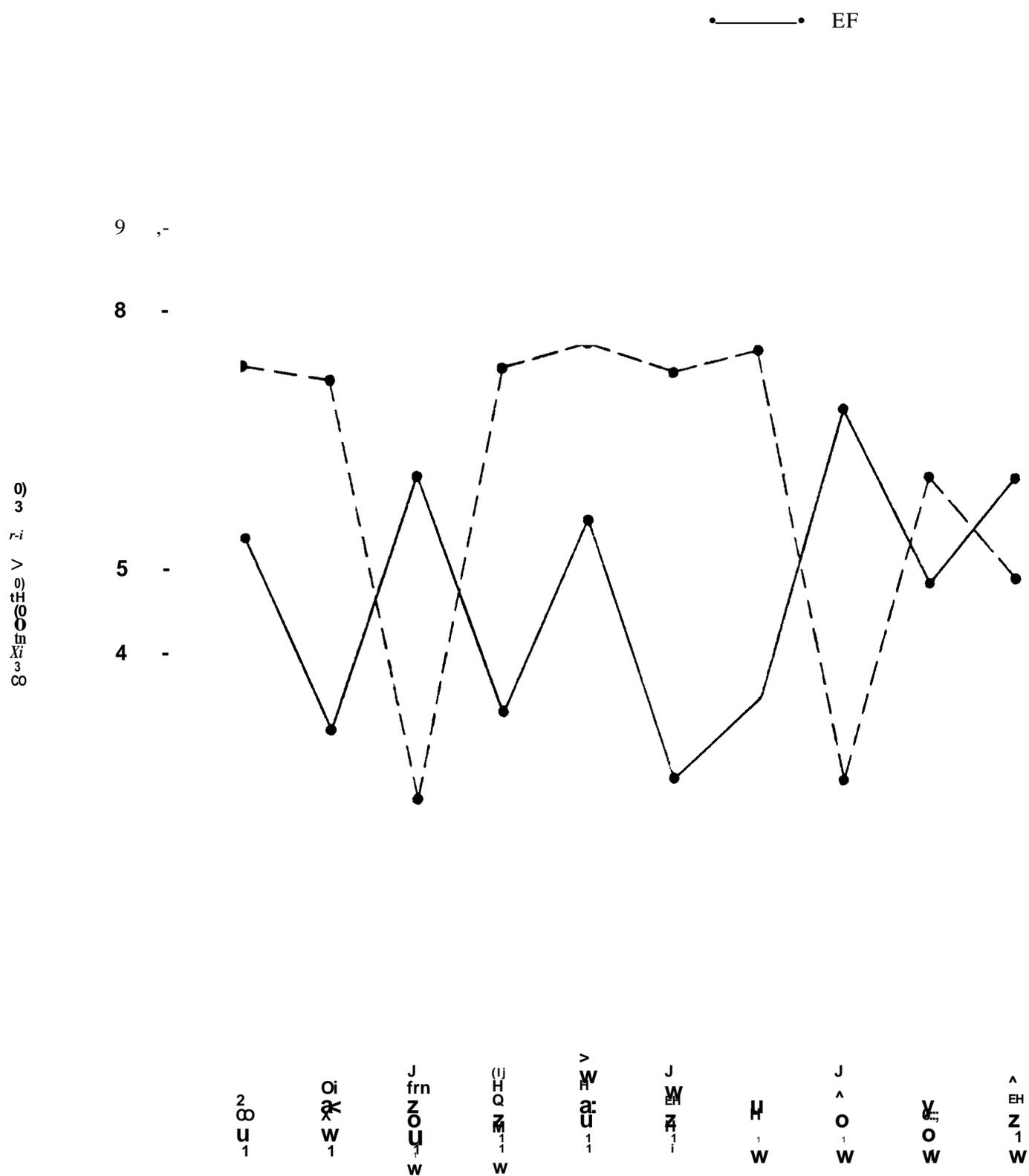


FIG. 2, FES-E PROFILES

8 ω X 9 = 1. 2 V 7. 3 Δ 9

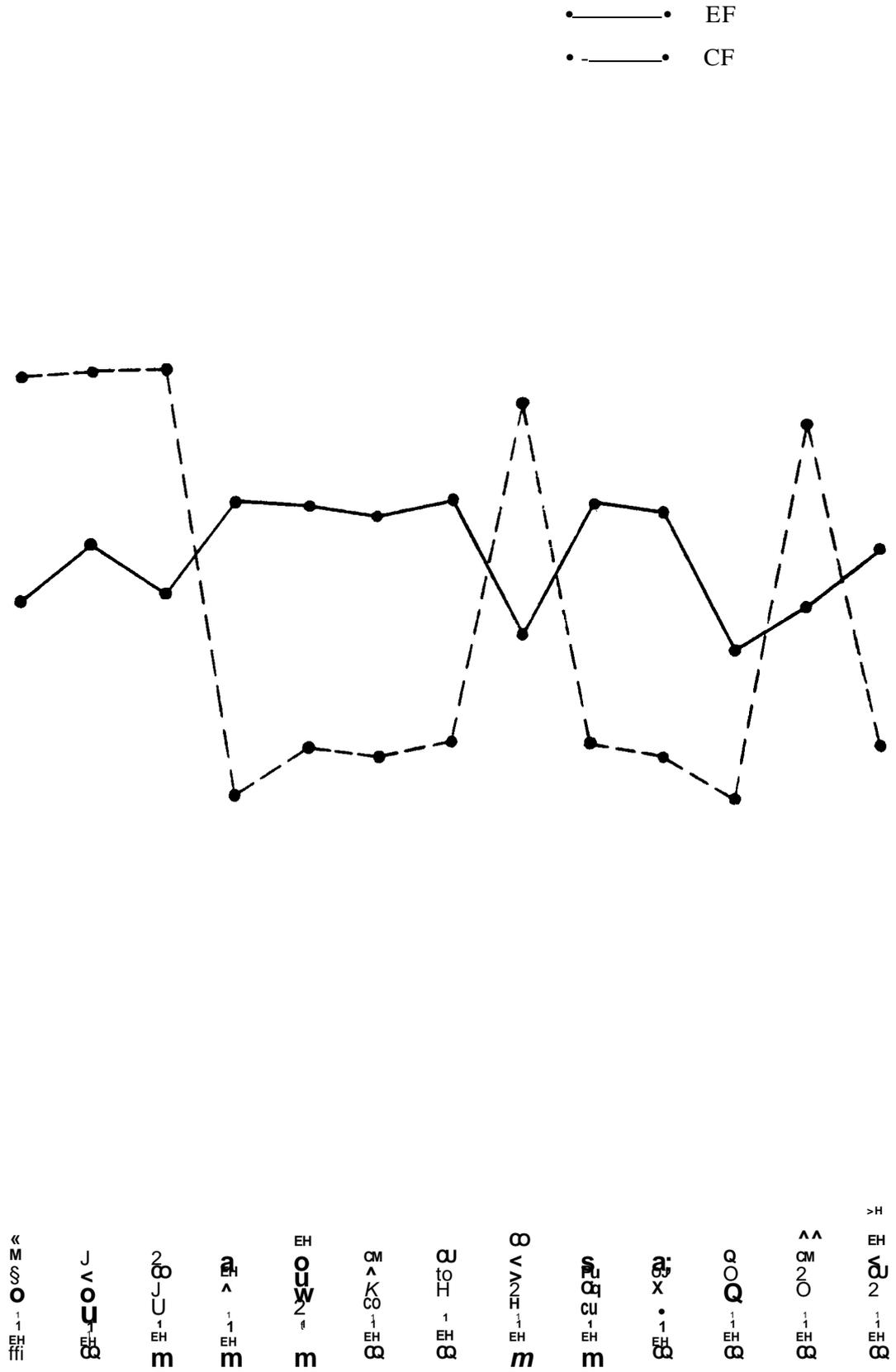


FIG. 3. BT PROFILES

were computed. The variable measures that did not show the expected directional differences were S-CONFL, S-CNTRL and E-CSN. The first two of these showed nonsignificant differences, at the specified significance level, and the third one showed a significant difference opposite the direction expected. The lack of confirmation of expected differences on these three measures is discussed in Chapter IV.

Two final items of information can be extracted from Tables 6-8 and the analysis reflected in Table 9. First, the average variance for the EF group appears somewhat greater than that for the CF group. This suggests that while the hypothesized differences were generally large and significant the EF families did not show quite as much uniformity in family structure as the CF families did. Second, correlations computed between corresponding FES-S and FES-E subscales for each group, shown in Table 9, indicate that the correspondence between subject and investigator ratings was higher for CF mothers than for EF mothers. This greater concordance in investigator and subject perceptions for CF families is also reflected in the difference between the BT-MYTH scores.

While the results shown in Tables 6-8 show generally unequivocal support (with the three subscale exceptions noted) for the research hypotheses, there remained a substantial amount of imprecision in these results at this point in the analysis. As a consequence, the author decided to subject the data to some additional statistical procedures, in an effort to simplify and clarify the results obtained. A stepwise discriminant analysis was completed for four sets of variable measures: FES-S, FES-E, BT and Combined. The results of these

TABLE 9

CORRELATIONS BETWEEN CORRESPONDING
FES-S AND FES-E MEASURES

Measure Pairs	CF Correlations N = 25	EF Correlations N = 25
S-CSN/E-CSN	R = -.038 S = .860	R = .007 S = .970
S-EXPR/E-EXPR	R = .829 S = .001	R = .513 S = .009
S-CONFL/E-CONFL	R = .558 S = .004	R = .227 S = .275
S-INDEP/E-INDEP	R = .482 S = .015	R = .162 S = .439
S-ACHIEV/E-ACHIEV	R = .459 S = .021	R = -.010 S = .962
S-INTEL/E-INTEL	R = .667 S = .001	R = .515 S = .008
S-REC/E-REC	R = .866 S = .001	R = .718 S = .001
S-MORAL/E-MORAL	R = .708 S = .001	R = .491 S = .013
S-ORG/E-ORG	R = .656 S = .001	R = .511 S = .009
S-CNTRL/E-CNTRL	R = .719 S = .001	R = .313 S = .128

analyses are shown in Tables 10-17. The discriminant analysis is reflected in two consecutive tables for each set of variable measures. The first of each pair of tables reflects the stepwise process, with associated changes in discriminant measures (Wilks' Lambda and Rao's V), The second of each pair displays the standardized coefficients for each variable that was included in the function and specifies the canonical correlation coefficient and percent of cases correctly classified. The signs of these coefficients are relatively unimportant, but their absolute magnitude reflects their relative importance in the discriminant function.

Table 11 displays the standardized coefficients for the significant variables in the FES-S discriminant function. It shows that S-MORAL accounts for most of the function's discriminating power, while contributions of S-REC, S-CNTRL, S-INTEL and S-CSN are progressively lower. The function based on these five variable measures alone accounts for approximately 76% of the variance in group membership and correctly classifies 96% of the cases in both groups. Table 13 shows the coefficients for the FES-E function. It indicates that E-MORAL makes the largest contribution, although E-INTEL makes a relatively comparable contribution. E-CONFL, E-CSN and E-CNTRL make progressively smaller contributions. The FES-E function alone accounts for about 78% of the group membership variance and correctly classifies 96% of the cases. Table 15 displays the coefficients for the BT function. It shows that BT-MYTH makes the greatest contribution followed by BT-NEGOT, BT-RESP, BT-MOOD, BT-CONFL and BT-COAL. The BT function alone accounts for about 58% of the group membership variance and

TABLE 10

DISCRIMINANT ANALYSIS SUMMARY: BEST COMBINATION
OF FES-S VARIABLE MEASURES

Step #	Variable Entered	F to Enter or Remove	Wilks' Lambda	S Level	Rao's V	Change in Rao's V	S of Change
	S-MORAL	85.22	.360	.000	85.22	85.22	.000
	S-INTEL	11.23	.291	.000	117.05	31.83	.000
	S-REC	3.39	.271	.000	129.22	12.17	.000
	S-CNTRL	5.19	.243	.000	149.68	20.46	.000
	S-CSN	1.07	.237	.000	154.48	4.80	.028

TABLE 11
STANDARDIZED DISCRIMINANT FUNCTION
COEFFICIENTS: BEST COMBINATION
OF FES-S VARIABLE MEASURES

Variable Measure	Coefficient
S-MORAL	-.658
S-REC	.257
S-CNTRL	.200
S-INTEL	.167
S-CSN	-.138

Canonical Correlation: .873

Percent of Cases Correctly Classified: 96%

TABLE 12

DISCRIMINANT ANALYSIS SUMMARY: BEST COMBINATION
OF FES-E VARIABLE MEASURES

Step #	Variable Entered	F to Enter or Remove	Wilks' Lambda	S Level	Rao's V	Change in Rao's V	S of Change
	E-MORAL	83.25	.366	.000	83,25	83.25	.000
	E-INTEL	21.99	.249	.000	144.66	61.40	.000
	E-CONFL	2.24	.238	.000	154.04	9.38	.002
	E-CNTRL	1.65	.229	.000	161.43	7.39	.007
	E-CSN	1.40	.222	.000	168.07	6.64	.010

TABLE 13

STANDARDIZED DISCRIMINANT FUNCTION
COEFFICIENTS: BEST COMBINATION
OF FES-E VARIABLE MEASURES

Variable Measure	Coefficient
E-MORAL	-.524
E-INTEL	.465
E-CONFL	-.281
E-CSN	-.144
E-CNTRL	.132

Canonical Correlation: .882

Percent of Cases Correctly Classified: 96%

TABLE 14
 DISCRIMINANT ANALYSIS SUMMARY: BEST
 COMBINATION OF BT VARIABLE MEASURES

Step #	Variable Entered	F to Enter or Remove	Wilks' Lambda	S Level	Rao's V	Change in Rao's V	S of Change
1	BT-MYTH	37.82	.560	.000	37.82	7.82	.000
2	BT-RESP	3.29	.521	.000	43.82	6.00	.014
3	BT-MOOD	4.49	.476	.000	52.78	8.96	.003
4	BT-NEGOT	1.51	.461	.000	56.16	3.38	.066
5	BT-CONFL	2.55	.436	.000	62.19	6.03	.014
6	BT-COAL	1.19	.424	.000	65.24	6.06	.080

TABLE 15
STANDARDIZED DISCRIMINANT FUNCTION
COEFFICIENTS: BEST COMBINATION
OF BT VARIABLE MEASURES

Variable Measure	Coefficient
BT-MYTH	.811
BT-NEGOT	.611
BT-RESP	.587
BT-MOOD	-.521
BT-CONFL	.439
BT-COAL	.216

Canonical Correlation: .759

Percent of Cases Correctly Classified: 88%

TABLE 16

DISCRIMINANT ANALYSIS SUMMARY: BEST COMBINATION
OF ALL VARIABLE MEASURES

Step #	Variable Entered	F to Enter or Remove	Wilks' Lambda	S Level	Rao's V	Change in Rao's V	S of Change
	S-MORAL	85.22	.360	,000	85.22	85.22	.000
	E-INTEL	14.77	.274	,000	127.09	41,87	.000
	E-MORAL	7.02	.238	,000	153.80	26,71	.000
	S-EXPR	3.10	.223	,000	167,70	13,90	.000
	BT-INVAS	3.23	.207	,000	183,52	15.82	.000
	S-REC	4.21	.189	,000	206.20	22,68	.000
	BT-MOOD	3.06	.176	,000	224.71	18,51	.000
8	BT-RESP	4.98	.157	,000	257.84	33,13	.000
	BT-NEGOT	2.31	.148	,000	275.51	17.67	.000
10	BT-CONFL	2.80	.138	,000	298.73	23,21	.000
11	S-INDEP	1.95	.131	000	316.52	17,80	.000
12	E-REC	2.23	.124	000	338.49	21,97	.000
13	S-ACHIEV	1.82	.118	000	357.99	19,50	.000
14	E-CONFL	1.10	.115	000	370.72	12,73	.000
15	S-ORG	1.22	.110	,000	385.70	14.98	.000
16	E-CSN	1.28	.107	,000	402.57	16.87	.000
17	E-MORAL (Removed)	.57	.108	,000	394.87	- 7.70	1.000

TABLE 17

STANDARDIZED DISCRIMINANT FUNCTION
 COEFFICIENTS: BEST COMBINATION
 OF ALL VARIABLE MEASURES

Variable Measure	Coefficient
S-INDEP	-.526
BT-INVAS	.487
BT-RESP	.470
S-REC	-.460
E-INTEL	-.438
S-MORAL	.368
BT-MOOD	-.342
S-EXPR	.307
E-CONFL	.248
E-REC	.232
BT-NEGOT	.190
S-ACHIEV	.188
BT-CONFL	.178
E-CSN	.166
S-ORG	.137

Canonical Correlation: .944

Percent of Cases Correctly Classified: 98?

correctly classifies 88% of the cases. Finally, Table 17 displays the coefficients for the most significant of all the measures combined. The significant variables in the Combined function include most of the variables which were significant in the individual functions (9 out of 15), but six were not included in the individual functions. The Combined function accounts for approximately 89% of the group membership variance and correctly classifies 98% of the cases.

It appears that these discriminant function analyses did a great deal to clarify the results obtained from the group comparisons. First, they have shown that there is substantial redundancy among the variable measures within and between each data source. Each discriminant analysis reduced the number of significant measures to approximately half of those eligible in each case. Second, they have shown that the five significant measures in the FES-S function alone or the five in the FES-E function alone can account for most of the variance in group membership and correctly classify 96% of the cases. While the Combined function yields a slight increase in the variance accounted for and correctly classifies one additional case, it adds ten additional variable measures in doing so. The practical and theoretical significance of this result is discussed further in Chapter IV-

Prediction of Dependent Variables

Tables 18-20 display the product-moment correlation coefficients (R) and associated significance levels (S) between each family system variable measure and the three dependent variables specified in Chapter II. Tables 21-23 display the results of a series of stepwise regression

analyses which were completed for each dependent variable. The choice of the first dependent variable, percent overweight, reflects an interest in any relationship between family system variables and the degree of symptom development. The choice of the latter two, number of sessions and pounds lost, reflects a need to determine the predictive significance of family system variables in the context of the ongoing obesity treatment program.

Percent Overweight

Tables 18-20 show that no single family system variable measure was significantly correlated, at the .05 level, with percent overweight. A combination of S-ACHIEV and S-EXPR, alone, accounts for about 24% of the variance in percent overweight, as shown in Table 21. No combination of FES-E measures alone or BT measures alone achieved a significant multiple correlation. A linear combination of twelve measures from all sources achieved a very high positive correlation and accounts for about 97% of the variance in percent overweight. The most important measures in this combination are BT-EXPR, BT-SELF and BT-CONFL, but several other measures also add a significant portion of variance.

Number of Sessions

Tables 18-20 reveal that nine variable measures have significant simple correlations with number of sessions. The significant measures were S-EXPR, E-ORG, BT-NEGOT, BT-RESP, BT-PERM, BT-MOOD, BT-CONFL, BT-EMPATHY and BT-GLOBAL. In terms of a "health-pathology" continuum in these variable measures, these simple correlations are all in the expected direction. None of them alone accounts for more than 25% of

TABLE 18

SIMPLE CORRELATIONS BETWEEN FES-S MEASURES
AND DEPENDENT VARIABLE MEASURES

Variable	% OVRWT	# SESS	LB LOST
S-CSN	R = .135 S = .521	R = -.021 S = .921	R = .033 S = .875
S-EXPR	R = .279 S = .176	R = .411 S = .041	R = .389 S = .055
S-CONFL	R = -.077 S = .716	R = -.337 S = .099	R = -.054 S = .797
S-INDEP	R = -.014 S = .948	R = .260 S = .210	R = -.128 S = .543
S-ACHIEV	R = -.348 S = .088	R = .113 S = .590	R = .027 S = .897
S-INTEL	R = .171 S = .414	R = .113 S = .589	R = .109 S = .604
S-REC	R = .089 S = .672	R = .193 S = .355	R = .048 S = .819
S-MORAL	R = .249 S = .230	R = -.301 S = .144	R = -.176 S = .398
S-ORG	R = .082 S = .698	R = .110 S = .600	R = .009 S = .965
S-CNTRL	R = .005 S = .980	R = -.155 S = .459	R = .084 S = .691

TABLE 19

SIMPLE CORRELATIONS BETWEEN FES-E MEASURES
AND DEPENDENT VARIABLE MEASURES

Variable	% OVRWT	# SESS	LB LOST
E-CSN	R = .088 S = .676	R = .315 S = .125	R = -.031 S = .883
E-EXPR	R = -.155 S = .459	R = .290 S = .160	R = .105 S = .617
E-CONFL	R = -.091 S = .666	R = -.379 S = .061	R = -.048 S = .820
E-INDEP	R = -.207 S = .321	R = .152 S = .468	R = .152 S = .467
E-ACHIEV	R = .028 S = .896	R = .427 S = .033	R = .085 S = .685
E-INTEL	R = .157 S = .454	R = .244 S = .240	R = .224 S = .282
E-REC	R = -.074 S = .725	R = .239 S = .250	R = .142 S = .497
E-MORAL	R = .269 S = .193	R = -.164 S = .434	R = -.046 S = .828
E-ORG	R = -.042 S = .843	R = .497 S = .011	R = .171 S = .414
E-CNTRL	R = .018 S = .930	R = -.083 S = .693	R = -.037 S = .860

TABLE 20

SIMPLE CORRELATIONS BETWEEN BT MEASURES
AND DEPENDENT VARIABLE MEASURES

Variable	% OVRWT	# SESS	LB LOST
BT-POWER	$\hat{R} = -.1^3$ S = .496	R = .338 S = .104	R = .065 S = .758
BT-COAL	$\hat{R} = -.1^{\wedge\wedge}$ S = .486	$\hat{R} = -.203$ S = .331	R = -.030 S = .886
BT-CLSN	$\hat{R} = -.^{\wedge\wedge\wedge}$ S = .909	R = .350 S = .086	R = .171 S = .415
BT-MYra	$\hat{R} = -.15^{\wedge}$ S = .463	R = -.391 S = .053	R = -.229 S = .272
BT-NEGOT	$\hat{R} = -.1^{\wedge\wedge}$ S = .393	$\hat{R} = -.^{\wedge\wedge\wedge}$ S = .045	$\hat{R} = -.241$ S = .243
BT-SELF	$\hat{R} = -.Q^Q$ S = .820	R = -.370 S = .069	R = -.246 S = .237
BT-RESP	$\hat{R} = -.OS1$ S = .690	$\hat{R} = -.^{\wedge\wedge\wedge}.7$ S = .016	$\hat{R} = -.224$ S = .283

TABLE 20—Continued
 SIMPLE CORRELATIONS BETWEEN BT MEASURES
 AND DEPENDENT VARIABLE MEASURES

Variable	% OVRWT	# SESS	LB LOST
BT-INVAS	R = -.196 S = .349	R = .212 S = .309	R = .172 S = .412
BT-PERM	R = .135 S = .520	R = -.449 S = .025	R = -.293 S = .156
BT-EXPR	R = .236 S = .256	R = -.322 S = .116	R = -.158 S = .452
BT-MOOD	R = .001 S = .995	R = -.500 S = .011	R = -.265 S = .200
BT-CONFL	R = -.211 S = .311	R = .475 S = .017	R = .135 S = .519
BT-EMPATHY	^ = ^^^ S = .672	R = -.403 S = .043	R = -.207 S = .321
BT-GLOBAL	^ = ^^^ S = ,680	R = -.443 S = .026	R = -.220 S = .292

TABLE 21

STEPWISE MULTIPLE REGRESSION ANALYSIS SUMMARY: % OVERWEIGHT

Variable Groups	Multiple R	R2	R2 Change	Simple R	Beta Weights	Overall F	D.F.	S
<u>SES-S</u>								
S-ACHIEV	,348	.121	.121	-.343	,407	3.45	2/22	^ .05
S-EXPR	,489	.239	.118	.279	,349			
SES-E								
None								
BT								
None								
<u>Combined</u>								
S-ACHIEV	348	.121	.121	-.348	.001	27.46	12/12	.000
S-EXPR	489	.239	.118	.297	.766			
E-MORAL	585	.342	.103	.269	.591			
BT-EXPR	677	.453	.116	.236	1.595			
E-CONFL	749	.561	.103	-.091	-.656			
BT-CONFL	801	.641	.080	-.211	-.904			
S-CONFL	840	.706	.065	-.077	-.141			
S-MORAL	864	.747	.041	.249	-.264			
BT-SELF	897	.305	.053	.043	-1.513			
E-REC	945	.893	.088	-.074	-.758			
BT-MOOD	969	.939	.047	.001	-.440			
S-INTEL	982	.965	.025	.171	.221			

TABLE 22

STEPWISE MULTIPLE REGRESSION ANALYSIS SUMMARY: # SESSIONS

Variable Groups	Multiple R	R ²	R ² Change	Simple R	Beta Weights	Overall F	D.F.	S
SES-S								
S-EXPR	,411	.169	.169	.411	.333			
S-CONFL	,571	.326	.157	-.337	-.441			
S-MORAL	,638	.406	.081	-.301	-.467	3.18	5/19	<.05
S-ORG	,662	.438	.032	.110	.231			
S-ACHIEV	,675	.456	.017	.113	-.144			
SES-E								
E-ORG	,497	.247	.247	.497	.806			
E-MORAL	.556	.309	.061	-.164	-.402	3.07	4/20	<.05
E-REC	.603	.363	.055	.239	-.241			
E-INDEP	.617	.380	.017	.152	-.192			
BT								
BT-MOOD	.500	.250	.250	-.500	-.777			
BT-RESP	.540	.291	.041	-.477	-.421	3.64	3/21	<:,05
BT-EMPATHY	.585	.342	.051	-.408	.604			
Combined								
BT-MOOD	.500	.250	.250	-.500	-1.449			
S-CONFL	.587	.345	.095	-.337	-.849			
S-MORAL	.670	.443	.104	-.301	-.319			
BT-INVAS	.721	.519	.071	.212	-.366			
BT-SELF	.766	,587	.067	-.370	-1.311			
S-INTEL	.809	.654	.067	.113	-.456			
BT-POWER	.844	,712	.058	.333	-,351			
E-INDEP	.864	,746	.034	.152	-,634	26,85	15/9	,000
S-EXPR	.885	.784	.037	.411	.543			
BT-EMPATHY	.918	.843	.059	-.403	1.269			
BT-COAL	.942	.388	.045	.203	.147			
E-MORAL	.961	.923	.036	-.164	.348			
E-CSN	.974	.948	.025	.315	-.378			
S-REC	.981	.962	.014	.193	-.392			
E-REC	.939	.978	.016	.239	.399			

TABLE 23

STEPWISE MULTIPLE REGRESSION ANALYSIS SUMMARY: LB, LOST

Variable Groups	Multiple R	R2	R2 Change	simple R	Beta Weights	Overall F	D,F.
<u>SES-S</u>							
None							
<u>SES-E</u>							
None							
BT							
None							
Combined							
S-EXPR	.389	.151	.151	.389	.935		
S-CSN	.439	.193	.041	-.031	-.816		
BT-MOOD	.533	.284	.092	-.265	-1.949		
S-REC	.595	.354	.070	.048	-.764		
E-MORAL	.662	.438	.084	-.046	.458		
BT-EMPATHY	.689	.475	.036	-.207	2.419		
BT-SELF	.752	.566	.091	-.246	-2.979		
BT-NEGOT	.789	.623	.053	-.243	-1.841		
E-INDEP	.815	.664	.041	.152	-.889	21.23	17/7 .000
E-REC	.840	.705	.041	.142	.076		
S-MORAL	.864	.747	.042	-.177	-.488		
BT-EXPR	.888	.788	.041	-.158	-1.343		
BT-POWER	.916	.839	.050	.065	-.517		
S-ACHIEV	.944	.891	.052	.027	.372		
BT-RESP	.964	.926	.035	-.224	.797		
S-INTEL	.982	.964	.037	.109	-.234		
S-ORG	.991	.981	.018	.009	.273		

the variance, however. Table 22 shows that various combinations of measures from each source achieve significant multiple correlations and account for higher proportions of the variance in number of sessions. The stepwise multiple regression analysis derived from the Combined pool of variable measures yields a highly significant multiple correlation and accounts for about 98% of the variance on the basis of 15 measures. The most important of the measures involved are BT-MOOD, BT-SELF and BT-EMPATHY.

Pounds Lost

Tables 18-20 show that no single variable measure has a significant simple correlation with pounds lost. Table 23 shows that no combination of variable measures within each scale has a significant multiple correlation with this outcome variable. However, Table 23 does show that a combination of 17 variable measures drawn from all three scales achieved a very high positive correlation and accounts for approximately 98% of the variance in pounds lost. BT-SELF, BT-EMPATHY, BT-MOOD, BT-EXPR and BT-NEGOT are the most important measures in the multiple regression equation.

Dependent Variable Intercorrelations

Table 24 displays the correlation coefficients between each pair of dependent variables targeted in this study- Only the correlation between number of sessions and pounds lost is significant. The coefficient for this pair shows that they share about 57% common variance. This reveals a primary reason why the multiple regression analyses for

TABLE 2 4
DEPENDENT VARIABLE INTERCORRELATIONS

% Overweight With # Sessions	% Overweight With Lb. Lost	# Sessions With Lb. Lost
R = .245 S = .238	R = .305 S = .138	R = .713 S = .001

these variables were quite similar for the combined set of predictors, although the strength of the correlational relationship was stronger for number of sessions-

Factor Analysis

While the t^2 -tests and discriminant functions demonstrated and simplified the differences between groups and the multiple regression analyses identified effective predictor measures for the dependent variables, considerable complexity remained in the results at this point. Statements could be made about reduced sets of most significant discriminant and predictor variables, but the interrelations among these variables remained obscure. In this context, it was decided to subject the data to a factor analysis in a final effort to clarify the results from the discriminant functions and multiple regression equations.

The data from all 50 cases (EF + CF) were utilized with a principal components analysis and varimax orthogonal rotation. The orthogonal factors extracted, their associated variable measure loadings and the percent of variance accounted for are shown in Tables 25-23 for the unrotated and rotated factor matrices. Table 25 shows the unrotated factor matrix, and Table 26 shows the percent of variance accounted for by each factor. Table 27 shows the rotated factor matrix in a way that facilitates the discernment of the relative loadings each variable measure has on each factor. Table 23 shows the same data which have been rearranged to clarify the bipolar structure and conceptual interpretation of each factor.

TABLE 25

UNROTATED FACTOR MATRIX

Variable Measures	Factor 1	Factor 2	Factor 3	Factor 4
S-CSN	-.666	.422	-.076	.102
S-EXPR	.698	-.155	.020	.015
S-CONFL	-.344	-.056	-.359	-.307
S-INDEP	.582	-.210	.199	.129
S-ACHIEV	.577	-.247	.244	.065
S-INTEL	.716	.091	.245	.115
S-REC	.771	.171	.044	.225
S-MORAL	-.763	.531	-.115	.080
S-ORG	.054	.644	.120	.211
S-CNTRL	-.197	.322	.590	-.549
E-CSN	.657	.358	.010	-.219
E-EXPR	.904	-.150	.055	-.144
E-CONFL	-.870	-.128	-.207	-.044
E-INDEP	.870	-.248	.130	-.051
E-ACHIEV	.695	.279	.130	.227
E-INTEL	.850	-.032	.197	-.155
E-REC	.869	.161	.060	.140
E-MORAL	-.733	.492	-.245	-.166
E-ORG	.641	.560	.046	.107
E-CNTRL	-.456	.480	.127	-.212
BT-POWER	.845	.087	-.155	-.023
BT-COAL	.678	.051	-.040	.068
BT-CLSN	.881	.184	-.106	.030
BT-MYTH	-.939	.026	.193	.100
BT-NEGOT	-.915	-.067	.071	.119
BT-SELF	-.912	-.024	.195	.064
BT-PESP	-.883	-.064	-.036	-.002
BT-INVAS	.304	-.265	-.169	-.068
BT-PERM	-.913	-.148	.116	.091
BT-EXPR	-.881	.039	.176	.216
BT-MOOD	-.346	-.268	.226	-.032
BT-CONFL	.900	.194	-.087	-.033
BT-EMPATHY	-.919	-.171	.143	.096

TABLE 2 6

UNROTATED FACTOR ANALYSIS: VARIANCE ESTIMATES

Factor	Eigenvalue	Percent of Variance	Cumulative Percent
	19.237	80.7	80.7
	2.560	10.7	91.4
	1.141	4.8	96.2
	.900	3.8	100,0

TABLE 27

ROTATED FACTOR MATRIX

Variable Measures	Factor 1	Factor 2	Factor 3	Factor 4
S-CSN	-.348	.717	-.030	.043
S-EXPR	.479	-.495	.173	-.092
S-CONFL	-.096	.213	-.538	-.014
S-INDEP	.272	-.519	.304	-.059
S-ACHIEV	.253	-.564	.274	.007
S-INTEL	.495	-.365	.462	.053
S-REC	.615	-.262	.458	-.140
S-MORAL	-.360	.863	-.060	.069
S-ORG	.224	.463	.444	.102
S-CNTRL	-.033	.140	.035	.874
E-CSN	.728	-.083	.171	.204
E-EXPR	.673	-.623	.150	.026
E-CONFL	-.665	.411	-.449	-.075
E-INDEP	.554	-.697	.214	-.012
E-ACHIEV	.571	-.160	.525	-.050
E-INTEL	.613	-.582	.234	.151
E-REC	.705	-.333	.436	-.081
E-MORAL	-.246	.833	-.306	.141
E-ORG	.707	.105	.473	.057
E-CNTRL	-.147	.566	-.039	.395
BT-POWER	.769	-.332	.163	-.129
BT-COAL	.558	-.298	.236	-.112
BT-CLSN	.809	-.284	.275	-.110
BT-MYTH	-.828	.467	-.083	.138
BT-NEGOT	-.312	.417	-.166	.013
BT-SELF	-.819	.410	-.114	.149
BT-RESP	-.717	.423	-.301	.029
BT-INVAS	.602	-.590	-.001	-.198
BT-PEP24	-.853	.337	-.186	.045
BT-EXPR	-.799	.462	.006	.045
BT-MOOD	-.853	.163	-.223	.166
BT-CONFL	.839	-.297	.249	-.049
BT-EMPATHY	-.879	.314	-.175	.053

TABLE 23

ROTATED FACTOR MATRIX: BIPOLAR REARRANGEMENT

	Factor 1		Factor 2		Factor 3		Factor 4
BT-CONFL	.839	S-MORAL	.863	E-ACHIEV	.525	S-CNTRL	.874
BT-CLSN	.809	E-MORAL	.834	E-ORG	.473	E-CNTRL	.395
BT-POWER	.769	E-CSN	.717	S-INTEL	.462	E-CSN	.204
E-CSN	.728	E-CNTRL	.566	S-REC	.458	BT-MOOD	.166
E-ORG	.707	S-ORG	.468	S-ORG	.444	E-INTEL	.151
E-REC	.705	BT-MYTH	.467	E-REC	.436	BT-SELF	.149
E-EXPR	.673	BT-EXPR	.462	S-INDEP	.304	E-MORAL	.141
S-REC	.615	BT-RESP	.423	BT-CLSN	.275	BT-MYTH	.133
E-INTEL	.613	BT-NEGOT	.417	S-ACHIEV	.274	S-ORG	.102
BT-INVAS	.602	E-CONFL	.411	BT-CONFL	.249	S-MORAL	.069
E-ACHIEV	.571	BT-SELF	.410	BT-COAL	.236	E-ORG	.057
BT-COAL	.553	BT-PERM	.337	E-INTEL	.234	BT-EMPATHY	.053
E-INDEP	.554	BT-EMPATHY	.314	E-INDEP	.214	S-INTEL	.053
S-INTEL	.495	S-CONFL	.213	S-EXPR	.173	BT-EXPR	.045
S-EXPR	.479	BT-MOOD	.163	E-CSN	.171	BT-PERM	.045
S-INDEP	.272	S-CNTRL	.140	BT-POT"JER	.166	S-CSN	.043
S-ACHIEV	.253	E-ORG	.105	E-EXPR	.150	BT-RESP	.029
S-ORG	.224	E-CSN	-.083	S-CNTRL	.035	E-EXPR	.026
S-CNTRL	-.083	E-ACHIEV	-.160	BT-EXPR	.006	BT-NEGOT	.018
S-CONFL	-.097	S-REC	-.262	BT-INVAS	-.001	S-ACHIEV	.007
E-CNTRL	-.147	BT-CLSN	-.284	S-CSN	-.030	E-INDEP	-.012
E-MORAL	-.246	BT-CONFL	-.297	E-CNTRL	-.039	S-CONFL	-.014
S-CSN	-.348	BT-COAL	-.298	S-MORAL	-.069	BT-CONFL	-.049
S-MORAL	-.360	BT-POWER	-.332	BT-MYTH	-.083	E-ACHIEV	-.050
E-CONFL	-.665	E-REC	-.333	BT-SELF	-.114	S-INDEP	-.053
BT-RESP	-.717	S-INTEL	-.365	BT-NEGOT	-.166	E-CONFL	-.075
BT-EXPR	-.799	S-EXPR	-.495	BT-EMPATHY	-.175	E-REC	-.081
BT-NEGOT	-.312	S-INDEP	-.519	BT-PEPJ^l	-.186	S-EXPR	-.092
BT-SELF	-.819	S-ACHIEV	-.564	BT-MOOD	-.223	BT-CLSN	-.110
BT-MYTH	-.828	E-INTEL	-.582	BT-RESP	-.301	BT-COAL	-.112
BT-PERM	-.853	BT-INVAS	-.590	E-MORAL	-.306	BT-PO\^R	-.129
BT-MOOD	-.858	E-EXPR	-.623	E-CONFL	-.449	S-REC	-.140
BT-EMPATHY	-.879	E-INDEP	-.697	S-CONFL	-.533	BT-INVAS	-.193

It is commonly found that the first factor tends to be a fairly general factor and accounts for a major portion of the variance, while the remaining factors are usually more specific and account for lesser portions of variance. Further, with a large number of variable measures, factors tend to be bipolar, having a few large positive and a few large negative variable loadings. Finally, factors are usually interpreted conceptually and labeled according to the variables showing the highest positive and negative loadings. Matrix rotations are completed to clarify the factor structure.

Table 26 shows that Factor 1 accounts for 80.7% of the total variance; Factor 2 accounts for 10.7%; Factor 3 accounts for 4.8%; and Factor 4 accounts for 3.8%. Since these factors are orthogonal, the variance is additive and sums to 100% of the total. Concerning the conceptual labeling of the four factors, Table 23 is the most useful. The factor loadings tabulated there show that each factor is indeed bipolar, although most of them are relatively complex. Factor 1 may be labeled as a general adjustment factor that emphasizes a equality of relationships dimension. Its highest bipolar loadings are on measures that reflect level of conflict, intimacy, constructive parental control, independence, constructive interaction and communication. Factor 2 may be labeled more specifically as reflecting a bipolar continuum between suppressive moral-religious control versus autonomy and self-actualization. Factor 3 may be labeled as reflecting a continuum between autonomy and self-actualization versus family conflict. Factor 4 may be labeled primarily as reflecting the rigidity of overt control.

The most obvious result of the factor analysis is that it demonstrated the possibility of reducing the 33 family system variable measures involved in the present study to four factors. The factor analysis also helps clarify the results from the discriminant functions and regression analyses by referring to the factor loadings of the most important variables involved. The statistical procedures involved in stepwise discriminant and multiple regression analyses are such that highly intercorrelated independent variables will not necessarily make a similar contribution to the equations nor make their independent contributions with the same algebraic sign. This appears to be due to two primary features. First, the discriminant and regression procedures partial out portions of variance in the independent and dependent variables accounted for by independent variables already in the equation before the contribution of a new variable is evaluated and added. Second, most of the variable measures involved are complex—i.e., constituted by more than one independent factor—as demonstrated by the present factor analysis. When the effects of one factor are partialled out, as a new variable is introduced into the equation, the remaining variance may be a function of one or more different factors. It is often likely that the correlations between such residual factors and the dependent variable residuals carry an algebraic sign opposite that of the portion of correlation already accounted for by the equation. This explanation may seem somewhat obscure, but it is important to an understanding of the relative magnitudes and algebraic signs of the discriminant function and multiple regression coefficients reported in the present study.

Interrater Reliabilities

Interrater reliability (product-moment) correlations were computed for each of the FES and BT subscales completed by the investigators. The correlations for the FES-E subscales were: CSN-.91, EXPR--71, CONFL~-73, INDEP-.71, ACHIEV-.87, INTEL--.82, REC~.93, MORAL-.75, ORG-.80 and CNTRL-.54. The correlations for the BT subscales were: POWER--96, CLSN-.91, MYTH-.80, NEGOT--91, SELF-.83, RESP-.60, INVAS-.85, PERM-.92, EXPR-.87, MOOD-.93, CONFL-.32, EMPATHY-.84 and GLOBAL-.96. These interrater reliabilities are generally quite high, and the ones presently obtained for the BT subscales are consistently higher than the corresponding values reported by the original authors. This suggests that the present investigators interpreted and utilized these family system measures with very high concordance, although the estimates involved were completed independently-

CHAPTER IV

DISCUSSION

Before discussing the general confirmation found for the research hypotheses, some reasonable explanation should be suggested for the results found for subscale measures S-CONFL, S-CNTRL and E-CSN. While three of the four measure differences hypothesized for the family system factor termed "rigidity" were verified by the data, the expected specific denial of conflict by EF mothers was not validated. In fact, the difference shown on S-CONFL was in the same direction as that for E-CONFL and BT-CONFL, although it was not quite large enough to reach the minimum significance level. S-CNTRL showed no differences between groups in the jt-test, but it was significant in the FES-S discriminant function. In combination with measures from the other scales, however, it accounted for no significant independent variance. Finally, E-CSN showed a significant group difference opposite the direction expected. An analysis of how this particular subscale was utilized by the investigators showed that it was interpreted in a manner similar to BT-CLSN, and a high score on this measure was given as a function of constructive intimacy rather than enmeshment. In terms of how E-CSN was actually utilized by the investigators then, the significant difference found between groups was consistent with the research hypothesis.

Validity of Minuchin's Model

On the basis of the results reported, one must conclude that the research hypotheses concerning the applicability of Minuchin's family system factors of enmeshment, overprotectiveness, rigidity and lack of conflict resolution to the families of the obese children in the present sample have been confirmed. Since virtually all of the family system measures showed significant differences between groups, however, there was a serious question concerning whether Minuchin's factors were empirically unique or merely manifestations of more fundamental or general factors. Certain conclusions about this question can be drawn from a re-examination of some of the data.

An examination of Table 11 in conjunction with the hypotheses developed in Chapter II concerning the correspondence between individual variable measures and Minuchin's four factor dimensions shows that separate measures (S-MORAL, S-REC, S-CNTRL and S-CSN) corresponding with each dimension are among the five most important measures in the FES-S discriminant function. Also, the fifth measure (S-Intel) clusters with other measures such as S-REC and S-INDEP (Table 28) and, therefore, also reflects the dimensions of enmeshment and overprotectiveness. Table 13 shows a similar pattern. Four of the variable measures in the FES-E discriminant function (E-MORAL, E-CONFL, E-CSN and E-CNTRL) correspond with Minuchin's four factor dimensions. The fifth, E-INTEL, also appears to reflect the dimensions of enmeshment and overprotectiveness, as shown in Table 23. Table 15 shows that four of the six most important measures in the BT discriminant function (BT-MYTH, BT-NEGOT, BT-RESP and BT-CONFL) correspond with three of

Minuchin's dimensions (rigidity, lack of conflict resolution and enmeshment). Also, as shown in Table 28, BT-RESP has some correspondence with the dimension of overprotectiveness. Thus, the common pattern shown in Tables 11, 13 and 15 suggests that each of Minuchin's family system factors makes an important contribution to the functions that best discriminate between the groups.

It was not yet clear, however, whether Minuchin's factor dimensions were empirically unique or independent. From the factor analysis results displayed in Table 28, one can draw some final conclusions about this issue. The four factors extracted in the analysis have been interpreted as involving (a) a general equality of relationships factor, (b) a suppressive moral-religious control versus autonomy and self-actualization factor, (c) an autonomy and self-actualization versus family conflict factor and (d) a rigidity of overt control factor. The first of these empirical factors does not appear to emphasize any one of Minuchin's theoretical dimensions, but involves high loadings on measures related to all four dimensions. The cluster patterns shown in the other three empirical factors suggest a much clearer picture, however. The variable measures clustered at the extremes of each bipolar factor may be viewed as subfactors which are negatively correlated. On this premise, four specific subfactors emerge from the analysis: (a) suppressive moral-religious control, (b) autonomy and self-actualization, (c) family conflict and (d) rigidity of overt control. It seems reasonable now to conclude that Minuchin's dimensions of enmeshment and overprotectiveness correspond essentially with the subfactor of autonomy and self-actualization; the dimension

of rigidity corresponds with the subfactor of rigidity of overt control; and the dimension of lack of conflict resolution corresponds with the subfactors of suppressive moral-religious control and family conflict. In general then, it appears that Minuchin's family system dimensions reflect relatively unique though not entirely independent empirical factors, at least for the present sample of families.

It now seems useful to construct a more detailed conceptual profile consistent with Minuchin's model for the families of obese children in the present sample. A description of these families in terms of the presently validated manifestations of Minuchin's four factors is presented below. This description is meaningful only in contrast to the control family results, although repeated reference to the contrast is not made.

Concerning the factor of enmeshment, the present families of obese children appear to be organized around a high level of intrusive interpersonal involvement, a relative lack of clear generational and role boundaries, and little development of independence and self-responsibility. Concerning the factor of overprotectiveness, they appear to discourage the child's involvement in cultural, social, recreational and achievement-oriented activities outside the home. The most explicit rationale for these restrictions expressed in these families seems to be a concern for the child's safety and welfare. The author has concluded, however, that the underlying determinant of these excessive restrictions is a shared sense of insecurity and fear of losing family cohesion. Concerning the factor of rigidity, these families appear to maintain a very strong investment in control over

conflictual transactions and view themselves unrealistically as relatively effectively functioning. The high family investment in maintaining control and established transactional patterns appears to impede the child's development of various abilities for functioning independently. Finally, concerning the factor of lack of conflict resolution, the obese families appear to maintain a high level of chronic conflict, demonstrate a lack of effective communication and problem-solving skills, and generally attempt to contain the eruption of family conflict through a heavy investment in moral-religious attitudes and activities. The explicit communication of independent feelings or attitudes seems to be very threatening to these families because of its potential for bringing conflicts into the open.

The two behavioral disturbances that are primarily responsible for generating obesity in children, overeating and insufficient activity, can be interpreted in terms of the foregoing family system features. Bruch's (1940) observation that food is used by families of obese children to smooth over conflict and limit the development of autonomy seems to correspond well with the present findings. When the use of food for these purposes in the family system is established early in the child's life, the development of excessive adipose tissue deposits is highly probable (conditioned, to some extent, by genetic factors). As the child's recreational, cultural and social activities outside the family are restricted, the existing positive energy balance and degree of obesity are exaggerated further. As the obesity develops, in the context of these and other related family patterns, the child's capacity and motivation for self-control, independence and physical

activity are progressively eroded. The causal sequence of factors is then no longer linear, but circular and homeostatic. The family patterns sustain the behavioral disturbances related to the obesity, and these in turn reinforce the family patterns.

This formulation is speculative, of course, and the present data might be interpreted otherwise. The author's general conceptual framework in presenting this formulation is homeostatic family systems theory. The formulation is not presented here as an empirically validated theory, but as a plausible and heuristic interpretation of the present empirical results.

Dependent Variable Predictors

The results concerning prediction of dependent variables from family system factors can be further elucidated. The following comments pertain primarily to the multiple regression results for the combined set of variable measures in each case. An examination of Table 21 reveals that, while measures relating to all of Minuchin's dimensions made some contribution to the multiple regression equation, those relating primarily to lack of conflict resolution are most important in accounting for the variance in percent overweight. Although it was not directly anticipated in the research hypotheses, this particular result appears to corroborate the primary system maintenance principle in Minuchin's model of psychosomatic families—i.e., that the child's symptom is primarily related to and functions to direct attention away from chronic unresolved family conflict. Tables 22 and 23 also reveal that, while measures relating to all of

Minuchin's dimensions account for some significant portions of the variance in number of sessions and pounds lost, those relating primarily to the dimension of lack of conflict resolution are most important in accounting for the variance in these outcome measures.

Generality of Results

It has already been noted that the sample of families in the present study is highly specific. It was not selected through randomization methods either from its immediate population pool or from a larger, broadly representative pool. It represents a population that needed study, but the results obtained may not be strictly or even partially applicable to dissimilar samples of families with obese children.

In this context, it is important to note that the magnitude of the FES results obtained in the present sample may reflect a bias in the instrument related to its original validation and norming. The original research sample consisted primarily of middle-class, White, two-parent families. Although the use of a matched control group and another instrument (BT) in the present study provided reasonable control over biasing of this type, it is clear that following studies with several dissimilar samples of families are still needed. It is also important to note that the relatively small sample size and the great magnitude of the group differences requires further caution concerning the generality of the specific discriminant function and multiple regression results obtained. With larger and dissimilar samples, shrinkage in the multiple and canonical correlations is likely, and

the variable loadings in the discriminant functions and factor analysis may change.

The analysis of the treatment outcome results obtained with these families must also be interpreted conservatively. The raw data shown in Appendix III (# SESS and LB LOST) reveals that the best treatment methods currently available and utilized with the EF subjects failed to be of any substantial or lasting benefit to most of them. Only three of the EF subjects lost 15 pounds or more, in one year, and the remaining 22 subjects that came through the CA program lost an average total of 1.2 pounds. Fifteen of the latter group showed no weight loss during their involvement in the program. Although it was found that the amount of weight lost was directly related to the number of sessions attended, only eight of the EF subjects attended ten or more sessions. Eleven others attended two sessions or less. While these outcome results could be accounted for on the basis of the family system variables discussed previously, they represent a dismal failure in treatment of the present sample of obese children. As a consequence, the multiple regression analyses of the present outcome results must be regarded cautiously-

Previous Findings

With the foregoing caveats in the background, it is useful to relate the results of the present study to the relevant findings from previous research. In Chapter I, it was suggested that Bruch's (1940) findings from extensive clinical case studies were in general correspondence with Minuchin's family system model of psychosomatic

illness in children. A more direct comparison of the present results with Bruch's early findings shows high concordance, indeed, although the samples involved were quite dissimilar. Although the sample restrictions noted above still hold, the high correspondence between the present results, Bruch's early findings and Minuchin's model suggests substantial general validity. This does not obviate the need for further validating research, however.

It is interesting to note that the present results concerning high enmeshment, low autonomy and lack of clarity in self-concept for the EF families seem to correspond with Schachter's earlier finding of greater environmental dependency and Bruch's finding of poorer inner differentiation in many of the obese. The present results do not, of course, confirm the previous findings noted, but they do appear to corroborate them.

Concerning the treatment results obtained for the present sample, some additional observations can be made in reference to previous treatment findings. The results obtained for the present sample are remarkably similar to those reported by Stunkard and McLaren-Hume (1959), although the treatment procedures involved in the present study were presumably more sophisticated than those utilized in the Nutrition Clinic of the New York Hospital at the time. Also, the present treatment results seem relevant to the reservations stated in Chapter I concerning a possible lack of generality in even short-term results obtained by investigators such as Wollersheim (1970) and Hagen (1970, 1974). In fact, these results are very similar to those obtained by Weisenberg and Fray (1974) which showed a lack of

effectiveness in applying the best documented SM and EM procedures to racial minority and low socioeconomic groups, even on a short-term basis.

New Treatment Approaches

The treatment results obtained in the present study are consistent with those obtained in the treatment of other psychosomatic disturbances in children prior to the family therapy work of Minuchin et al. (1975). They also bring to mind again the conclusion stated by Bruch (1973, p. 343) that she "cannot conceive of successful therapeutic work without changing the noxious [family! interaction." Two additional observations seem relevant to the present need for developing a new; therapeutic approach to childhood obesity- First, given the demonstrated validity of Minuchin's family system model for the present sample and given the unique success previously demonstrated by his family therapy approach to other psychosomatic syndromes, it now appears quite possible that a similar family therapy approach to childhood obesity may have much greater success in cases such as these. Second, a central principle has emerged in the family therapy literature that an identified patient's symptoms play a key role in maintaining family system homeostasis. Corroborative evidence to this effect was found in the present study, in the multiple regression results relating lack of conflict resolution measures to degree of obesity and response to treatment. The implication is, however, that modification of a child's symptoms will usually be successful only to the extent that the family system or other immediate social system within which he lives is

modified to accommodate and reinforce his symptom changes. Short of a complete shift to a family therapy model of treatment for cases such as these, it would make sense to at least add a family therapy or family system education component to existing treatment programs. This suggests a rational direction for new therapeutic development, but it does not demonstrate validity of an application of family therapy to childhood obesity. This can be done only through forthcoming research.

If a family therapy approach to childhood obesity were devised on the basis of the present results, several family system features would have to be targeted for intervention prior to or concurrent with efforts at weight reduction. The family therapist would necessarily develop strategies to reduce family enmeshment by clarifying generational boundaries, reducing intrusive interactions and enhancing the child's freedom and skill in functioning independently. The overprotective pattern would need modification in the direction of encouraging greater social, recreational and cultural involvement outside the home. Some change would be needed also in the family's perception of the child's capacity to take care of himself outside the home. The rigidity of controls and established transactional patterns would have to be addressed in terms of the child's needs for continuous development and greater autonomy- The parents would have to be encouraged to gradually relinquish their attitude of regarding the child as relatively helpless and in need of constant supervision or control, as the child is encouraged toward more self-responsibility and self-expression. Finally, the parents and whole family would have to be addressed in terms of their need to improve communication and conflict resolution skills.

Moralistic-religious attitudes that function to maintain suppressive control should probably not be attacked directly but bypassed or placed in a broader context of human relationship needs.

Many of the foregoing family therapy interventions could be implemented through a problem-centered approach to the child's eating and activity disturbances. Minuchin's structural family therapy approach suggests that the parents and other family members can be drawn into a cooperative effort to deal with the child's symptoms such that the desirable transactional changes occur apparently as by-products of the primary focus on symptom change. Many existing SM procedures for obesity treatment could be integrated effectively into a family therapy approach of this type, and family system changes could be facilitated as the child is assisted in losing weight.

Planned Research

The present investigation was conceived as one component of a more extensive research program concerning the nature and treatment of obesity. An awareness of several research needs has emerged from the present study- First, as mentioned previously, this type of research should be extended to samples from other populations of obese children. Second, it should be extended to samples in which the identified patient is an adult and parent. The known tendency for family patterns to be transmitted across generations suggests that this direction of research may be fruitful. Third, there is a need to determine whether the number and types of variable measures used in the present study can be further reduced and simplified. The results

of the discriminant functions, multiple regressions and factor analysis in the present investigation suggest that this will be quite possible. The accomplishment of this objective would do much to simplify the major theoretical and practical tasks in the area of obesity research. Fourth, further research is needed to determine whether Minuchin's family system model is equally applicable to different psychosomatic symptom types or whether there are significant differences among them as, for example, between childhood obesity and asthma. The results from a more extensive comparative study could also have major theoretical and therapeutic implications.

Finally, there remain several significant research needs in the area of obesity which were discussed in Chapter I. In general terms, the important remaining research problems in this area center around a need for empirical validation of a basic theory of obesity which (a) is sensitive to individual and subgroup differences in psychological-developmental, behavioral, family system and social factors and (b) relates such differences systematically to various subclasses of therapeutic procedures which may have conditionally differential effects. More simply, the current need is to determine for whom and under what conditions the present theories and therapies are appropriate. Thus, we end approximately where we began—somewhat wiser, perhaps, but still facing the same task.

Summary

Previous empirical findings concerning the nature and treatment of obesity were reviewed and critiqued. It was concluded that (a) the

best documented therapeutic approaches to obesity management currently available have shown little long-term clinical value and (b) the empirical literature concerning the determinants of obesity has substantial areas of weakness or incompleteness. It was suggested that further experimentation in therapeutic approaches to obesity should await more basic research concerning the determinants of obesity.

On the basis of a thorough assessment of the relative strengths and weaknesses in the research already published concerning the determinants of obesity, an empirical study was formulated to answer questions in an area where it appeared that the least was known and the most could be gained theoretically and therapeutically.

It was suggested that the area of greatest weakness concerning the determinants of obesity involves family system factors. Some hypotheses had been developed in Bruch's early clinical case studies, but no systematic empirical research had been completed to test these or alternate hypotheses in this area. It was noted that Bruch's early hypotheses appeared to be in basic correspondence with the central components of a general family system model of psychosomatic disturbances in children developed recently by Minuchin. On the basis of this unexpected correspondence and the unparalleled success of the family therapy approach developed from Minuchin's model for other psychosomatic disturbances, a study was developed to examine family system variables in childhood obesity. The present study evaluated such variables in terms of their potential for (a) discriminating the families of obese children from those of normals and (b) accounting for responses to therapy in an existing obesity treatment program.

It was hypothesized that a sample of families with obese children (EF) would differ significantly from a sample of families with only normal children (CF) in terms of measures reflecting Minuchin's family system factors of (a) enmeshment, (b) overprotectiveness, (c) rigidity and (d) lack of conflict resolution.

Twenty-five consecutive patient families seen in an ongoing obesity treatment program were evaluated for the EF group. The CF group was assembled from 25 families which were selected according to the matching variables of race, socioeconomic status, family size, number of parents, and subject's sex, age and sibling position. The CF subjects were also screened to eliminate any history of obesity, psychosomatic illnesses and psychiatric disturbances. Using two scales that measure relevant family system variables, group differences were assessed by *t*-test and discriminant function statistics. Virtually all of the hypothesized variable measure differences were verified, and smaller sets of measures which accounted for most of the group membership variance corresponded closely with Minuchin's model components. The results from a series of stepwise regression analyses and an orthogonal factor analysis showed that (a) most of the variance in the dependent variables of percent overweight, number of sessions in treatment and pounds lost could be accounted for by a linear combination of family system variable measures primarily reflecting lack of conflict resolution, and (b) Minuchin's model components correspond well with the empirical factors extracted from the present data.

It was concluded that Minuchin's family system model of psychosomatic disturbances in children is basically applicable to the present

sample of families with obese children. Although these results basically confirmed Bruch's earlier findings concerning a dissimilar sample of obese children, their general validity is still considered to be a matter of further empirical research with other population samples. In the context of several empirical and theoretical considerations, however, it was concluded that some development and application of family therapy techniques based on the present findings would be justified. Several suggestions were made concerning specific family therapy procedures which might be utilized in the treatment of childhood obesity.

REFERENCES

- Abramson, E. E. A review of behavioral approaches to weight control. Behavior Research & Therapy, 1973, 11, 547-556.
- Ayllon, T. Intensive treatment of psychotic behavior by stimulus satiation and food reinforcement. Behaviour Research & Therapy, 1963, 1, 53-61.
- Balch, P. and Ross, A. W. A behaviorally oriented didactic-group treatment of obesity: An exploratory study. Journal of Behavior Therapy and Experimental Psychiatry, 1974, 5, 239-243.
- Bernard, J. L. Rapid treatment of gross obesity by operant techniques. Psychological Reports, 1968, 23, 663-666.
- Bornstein, P. H. and Sippelle, C. N. Group treatment of obesity by induced anxiety. Behaviour Research & Therapy, 1973, 11, 339-341.
- Bray, G. A. (Ed.) Obesity in perspective. Washington, D. C.: U. S. Government Printing Office, 1973,
- Bruch, H. Obesity in childhood and personality development. American Journal of Orthopsychiatry, 1941, 11.
- Bruch, H. and Touraine, A. B. Obesity in childhood: V. The family frame of obese children. Psychosomatic Medicine, 1940, 2, 142-206.
- Bruch, H. Eating disorders. New York: Basic Books, Inc., 1973.
- Bychowski, G. On neurotic obesity. Psychoanalytic Review, 1950, 34.
- Cautela, J. R. Treatment of compulsive behavior by covert sensitization. Psychological Record, 1966, 16, 33-41o

- Cautela, J, R, The treatment of overeating by covert conditioning. Psychotherapy; Theory, Research and Practice, 1972, 9_, 211-216.
- Chapman, R, F, and Smith, J. W, Punishment and self-management training in the elimination of cigarette smoking. Paper presented at the Oregon-Washington State Psychological Association, Richland, Washington, 1970.
- Choksi, R. M., Bower, P., Pollard, V, D. and Mankad, V. N. Calories Anonymous: A program for weight control in adolescents. Proceedings of the Chicago Institute of Medicine, 1977, 3]^, 172.
- Clinton, K. J. and Mason, E, E. Gastric surgery for the relief of morbid obesity. The Archives of Surgery, 1973, 106, 428.
- Cohen, J. Statistical power analysis for the behavioral sciences. New York: Academic Press, 1977.
- Conrad, E, H. Psychogenic obesity: The effects of social rejection upon hunger, food craving, food consumption, and the drive-reduction value of eating for obese vs. normal individuals. Unpublished doctoral dissertation. New York University, 1968,
- Corso, P- J. and Joseph, W. L. Intestinal bypass in morbid obesity- Surgical Gynecology & Obstetrics, 1974, 138, 1,
- Dano, P., Jainum, S. and Vagn-Neilsen, O. Intestinal shunt operation in obesity. Scandinavian Journal of Gastroenterology, 1973, 8_, 457.
- Deri, S. K. A problem in obesity. In A, Burton and R, E, Harris (Eds,) Clinical studies in personality. New York: Harper, 1955.
- Dwyer, J. T., Feldman, J, J. and Mayer, J. The social psychology of dieting. Journal of Health and Social Behavior, 1970, 11, 269-287.

- Erickson, M, H. The utilization of patient behavior in the hypnotherapy of obesity: Three case reports. American Journal of Clinical Hypnosis, 1960, 3_, 112-116,
- Ferster, C, B,, Nurnberger, J, I. and Levitt, E. B. The control of eating. Journal of Mathetics, 1962, _1, 87-109.
- Forbes, G. B. The great denial. Nutrition Reviews, 1967, £5^, 355.
- Foreyt, J. P. and Kennedy, W, A. Treatment of overweight by aversion therapy. Behaviour Research & Therapy, 1971, 9_, 29-34,
- Foreyt, J. P. and Hagan, R. L. Covert sensitization: Conditioning or suggestion? Journal of Abnormal Psychology, 1973, 82_, 17-23.
- Foreyt, J. P. and Parks, J. T. Behavioral controls for achieving weight loss in the severely retarded. Journal of Behavior Therapy and Experimental Psychiatry, 1975, 6^, 27-29.
- Fowler, R, S,, Fordyce, W. E., Boyd, V- D. and Masock, A. The mouthful diet: A behavioral approach to overeating. Rehabilitation Psychology, 1972, _12, 93-106.
- Frank, B. W. Gonadotrophin therapy in obesity. American Journal of Clinical Nutrition, 1964, 14_, 133-136.
- Fuller, D. S. The clinical challenge of obesity. Paper presented to a symposium on obesity at The University of Texas Health Science Center, San Antonio, November, 1974.
- Glucksman, M. L, and Hirsch, J. The perception of body size: The response of obese patients to weight reduction. Psychosomatic Medicine, 1969, 31, 1-7.

- Goldman, R. L, The effects of the manipulation of the visibility of food on the eating behavior of obese and normal subjects. Unpublished doctoral dissertation, Columbia University, 1968.
- Grossman, M. I, Satiety signals, American Journal of Clinical Nutrition, 1960, 1, 565-566.
- Hagen, R. L. Group therapy versus bibliotherapy in weight reduction. Unpublished doctoral dissertation. University of Illinois, 1970.
- Hall, S. M. Self-control and therapist control in the behavioral treatment of overweight women. Behaviour Research & Therapy, 1972, 10, 59-67.
- Hall, S. M. Behavioral treatment of obesity: A two-year follow-up. Behaviour Research & Therapy 1973, 11, 647-643.
- Hall, S. M. and Hall, R. G. Behavioral control of obesity: A review. Catalog of Selected Documents in Psychology, 1973, 3, 129.
- Hall, S. M., Hall, R, G., Hanson, R, W. and Borden, B. L. Permanence of two self-management treatments of overweight in university and community populations. Journal of Consulting and Clinical Psychology, 1974, 42, 781-736,
- Hanley, F. W. The treatment of obesity by individual and group hypnosis, Canadian Psychiatric Association Journal, 1967, 12, 549-551,
- Harmatz, M, G. and Lupac, P, Behavior modification of overeating in a psychiatric population. Journal of Consulting and Clinical Psychology, 1968, 36, 583-589,
- Harris, M, B. Self-directed program for weight control: A pilot study, Journal of Abnormal Psychology, 1969, 74, 263-270.

- Harris, M. B. and Bruner, C. G., A comparison of self-control and contract procedures for weight control. Behaviour Research & Therapy, 1971, 2/ 347-354,
- Harris, M. B. and Hallbauer, E. S. Self-directed weight control through eating and exercise. Behaviour Research S Therapy, 1973, 11, 523-529,
- Hashim, S. A, and Van Itallie, T. B, Studies in normal and obese subjects with monitored food dispensary device. Annals of the New York Academy of Science, 1965, 131, 654-661,
- Hinkle, L. E. Occupation, Education and coronary heart disease. Science, 1968, 161, 238.
- Hirsch, J., Knittle, J. L. and Salans, L. B. Cell lipid content and cell number on obese and nonobese human adipose tissue. Journal of Clinical Investigation, 1966, 45, 1023.
- Homme, L. E, Perspectives in psychology, XXIV: Control of coverants the operants of the mind. Psychological Record, 1965, 15, 501-511.
- Homme, L. E, Contiguity theory and contingency management. Psychological Record, 1966, 16, 233-241.
- Horan, J. J., Baker, S. B., Hoffman, A. M. and Shute, R. E. Weight loss through variations in the coverant control paradigm. Journal of Consulting and Clinical Psychology, 1975, 43, 68-72.
- Howard, A, (Ed.) Recent advances in obesity research: I. Westport, Connecticut: Technomic Publishing Company, 1974,
- Janda, L. H. and Rimm, D. C. Covert sensitization in the treatment of obesity. Journal of Abnormal Psychology, 1972, 80, 37-42.

- Jeffrey, D, B, A comparison of the effects of external control and self-control on the modification and maintenance of weight. Journal of Abnormal Psychology, 1974, 83' 404-410,
- Jeffrey, D, B., Christensen, E, R, and Pappas, J, P. Developing a behavioral program and therapist manual for the treatment of obesity. Journal of the American College Health Association, 1973, ^, 455-464.
- Johnson, W. G, The effect of prior-taste and food visibility on the food-directed instrumental performance of obese individuals. Unpublished doctoral dissertation. Catholic University of America, 1970,
- Johnson, M. L., Burke, B. S, and Mayer, J. Relative importance of inactivity and overeating in energy balance of obese high school girls. American Journal of Clinical Nutrition, 1956, 4, 37-44.
- Kanfer, F, H, Self-regulation; Research issues, speculation. In C, Nueringer and J. L, Michaels (Eds.), Behavior Modification in Clinical Psychology. New York: Appleton-Century-Crofts, 1970.
- Kanfer, F. H, The maintenance of behavior by self-generated stimuli and reinforcement. In A, Jacobs and L. B. Sachs (Eds,), Psychology of private events. New York: Academic Press, 1971.
- Kanfer, F. H, and Karoly, P. Self-control: A behavioristic excursion into the Lion's Den, Behavior Therapy, 1972, 3, 398-416.
- Kaplan, H. I, and Kaplan, H. S. The psychosomatic concept of obesity. Journal of Nervous and Mental Disease, 1957, 125, 181-201.
- Kennedy, W, A. and Foreyt, J. P, Control of eating behavior in an obese patient by avoidance conditioning. Psychological Reports, 1968, 22.

- Knittle, J. L, and Hirsch, J, Effect of early nutrition on the development of rat epididymal fat pads: Cellularity and metabolism. Journal of Clinical Investigation, 1968, 42, 2091-2093.
- Kroger, W. S. Systems approach for understanding obesity: Management of behavioral modification through hypnosis. Psychiatric Opinion, 1970, 1_, 7-19.
- Lewis, J. M., Beavers, W. R., Gossett, J. T, and Phillips, V, A, No single thread; Psychological health in family systems. New York; Brunner/Mazel, 1976.
- Mahoney, M. J. Research issues in self-management. Behavior Therapy, 1972, 3_, 45-63.
- Mahoney, M, J, Self-reward and self-monitoring techniques for weight control. Behavior Therapy, 1974, 5^, 43-57.
- Mahoney, M. J., Moura, N, G, and Wade, T, C. The relative efficacy of self-reward, self-punishment and self-monitoring techniques in weight loss. Journal of Consulting and Clinical Psychology, 1973, 4£, 404-407.
- Mann, R. A, The behavior-therapeutic use of contingency contracting to control an adult behavior problem; Weight control. Journal of Applied Behavioral Analysis, 1972, 5^, 99-109.
- Manno, B. and Marston, A. R. Weight reduction as a function of negative covert reinforcement (sensitization) versus positive covert reinforcement. Behaviour Research & Therapy, 1972, 10, 201-207.
- Mayer, J. Overweight. Englewood Cliffs, N. J.: Prentice-Hall, 1968.
- McFee, A. S. S\irgical approaches—past and present. Paper presented at The U. of Texas, San Antonio, November, 1974.

- Mendelson, M. Psychological aspects of obesity. International Journal of Psychiatry, 1966, 2[^], 599-610.
- Meyer, V. and Crisp, A. H. Aversion therapy in two cases of obesity-
Behaviour Research & Therapy, 1964, 2[^], 243-247.
- Meynen, G. E. A comparative study of three treatment approaches with the obese: Relaxation, covert sensitization and modified systematic desensitization. Dissertation Abstracts International, 1970, 31., 2998.
- Minuchin, S. Personal communication, 1977.
- Minuchin, S., Baker, L., Rosman, B. L., Liebman, R., Milman, L. and Todd, T. C. A conceptual model of psychosomatic illness in children. Archives of General Psychiatry, 1975, 32[^], 1031-1038.
- Moore, C. H. and Crum, B. C- Weight reduction in a chronic schizophrenic by means of operant conditioning procedures: A case study. Behaviour Research & Therapy, 1969, 7[^], 129-131.
- Moos, R. H. Preliminary manual for Family Environment Scale. Palo Alto: Consulting Psychologists Press, 1974
- NCHS Growth Charts. In Monthly Vital Statistics Report, 1976, 25[^], 76-1120. Published by Health Resources Administration, Rockville, Maryland.
- Nisbett, R. E. Taste, deprivation and weight determinants of eating behavior. Journal of Personality and Social Psychology, 1973, 10, 107-116. (b)
- Nisbett, R. E. Determinants of food intake in human obesity. Science, 1968, 159, 1254-1255. (a)

- Penick, S. B., Fillion, R., Fox, S, and Stunkard, A. J. Behavior modification in the treatment of obesity. Psychosomatic Medicine, 1971, 33.f 49-55.
- Penick, S, B, and Stunkard, A, J, Newer concepts of obesity. Medical Clinics of North America, 1970, 54_, 745-754.
- Pliner, P. Effects of liquid and solid preloads on the eating behavior of obese and normal persons. Unpublished doctoral dissertation, Columbia University, 1970.
- Riskin, J. and Faunce, E. An evaluative review of family interaction research. Family Process, 1972, 11^, 365-455.
- Riskin, J- and Faunce, E. Family interaction scales scoring manual. Palo Alto: Mental Research Institute, 1969.
- Rodin, J. Effects of distraction on performance of obese and normal subjects. Unpublished doctoral dissertation, Columbia University, 1970.
- Romanczyk, R. G. Self-monitoring in the treatment of obesity: Parameters of reactivity. Behavior Therapy, 1974, 5_, 531-540.
- Romanczyk, R, G., Tracey, D, A,, Wilson, G. T. and Thorpe, G, L, Behavioral techniques in the treatment of obesity: A comparative analysis. Behaviour Research & Therapy, 1973, 11, 629-640.
- Salans, L. B., Knittle, J. L, and Hirsch, J. The role of adipose cell size and adipose tissue insulin sensitivity in the carbohydrate intolerance of human obesity. Journal of Clinical Investigation, 1968, 47, 153-165.

- Schachter, S, Cognitive effects on bodily functioning: Studies of obesity and eating. In D. C, Glass (Ed.), Neurophysiology and emotion. New York: Rockefeller University Press and Russel Sage Foundation, 1967,
- Schachter, S, Obesity and eating. Science, 1963, 161, 751-756.
- Schachter, S. Some extraordinary facts about obese humans and rats. American Psychologist, 1971, 26, 129-144,
- Schachter, S., Goldman, R. and Gordon, A. Effects of fear, food deprivation and obesity on eating. Journal of Personality and Social Psychology, 1968, 18, 91-97.
- Schachter, S. and Gross, L. P, Manipulated time and eating behavior. Journal of Personality and Social Psychology, 1968, 10, 98-106.
- Schofield, W. Psychotherapy, the purchase of friendship. Englewood Cliffs, N. J,: Prentice-Hall, 1964.
- Shulman, J. M. The behavioral control of eating. Unpublished master's thesis. University of Montana, 1971.
- Silverstone, J. T., Gordon, R. P. and Stunkard, A. J. Social factors in obesity in London. The Practitioner, 1969, 202, 632.
- Smith, T. J. Obesity; Its causes treated by hypnosis. Journal of the American Institute of Hypnosis, 1972, 13, 130-184.
- Sohlkhah, N,, and Shipman, W, G. Body image distortion in obese women. Psychosomatic Medicine, 1967, 29, 540.
- Stimbert, V, E, and Coffey, K. R, Obese children and adolescents: A review. ERIC Clearinghouse on Early Childhood Education: Research Relating to Children, 1972 (March), No. 30.

- Stollak, G. E. Weight loss obtained under different experimental procedures. Psychotherapy: Theory, Research and Practice, 1967, 4, 61-64,
- Strodtbeck, F. L. Husband-wife interaction over revealed differences. American Sociological Review, 1951, 16, 468-473.
- Stuart, R. B. Behavioral control of overeating. Behaviour Research & Therapy, 1967, 5, 357-365.
- Stuart, R. B. A three dimensional program for the treatment of obesity. Behaviour Research & Therapy, 1971, 9, 177-186.
- Stuart, R. B. and Davis, B. Slim chance in a fat world: Behavioral control of overeating. Champaign, Ill.: Research Press, Inc., 1972. (a)
- Stuart, R. B. and Davis, B. Slim chance in a fat world; Behavioral control of overeating. (condensed edition) Champaign, Ill.: Research Press, Inc., 1972. (b)
- Stunkard, A. J. Obesity. In A. M. Freedman, H. I. Kaplan and B. J. Sadock (Eds.) Comprehensive Textbook of Psychiatry. Baltimore: Williams & Wilkins Co., 1975, pp, 1648-1655.
- Stunkard, A. J. The management of obesity. New York State Journal of Medicine, 1958, 58, 79-87.
- Stunkard, A. J. Obesity and the denial of hunger. Psychosomatic Medicine, 1959, 21, 281-289.
- Stunkard, A. J. New therapies for eating disorders. In N. Kiell (Ed.), The psychology of obesity. Springfield, Ill.; Charles C. Thomas, 1971.

Stunkard, A, J, and Burt, v. Obesity and body image: II. Age at onset of disturbances in body image. American Journal of Psychiatry, 1967, 123, 1443.

Stunkard, A, J. and Koch, C. The interpretation of gastric motility: I, Apparent bias in the reports of hunger by obese persons. Archives of General Psychiatry, 1964, 13[^], 74-82,

Stunkard, A. J. and Mendelson, M. Obesity and body image: Characteristics of disturbance in the body image of some obese persons. American Journal of Psychiatry, 1967, 123, 1296-1300,

Stunkard, A, J, and McLaren-Hume, M, The results of treatment of obesity. Archives of Internal Medicine, 1959, 103, 79-85.

Tyler, V. O, and Straughan, J. H. Coverant control and breath holding for the treatment of obesity. Psychological Record, 1970, 20, 473-478.

van der Veen, F. Family unit inventory. Chicago: Institute for Juvenile Research, 1969.

Weisenberg, M, and Fray, E, What's missing in the treatment of obesity by behavior modification? Journal of the American Dietetic Association, 1974, 65[^], 410-414,

Wick, E., Sigman, R. and Kline, M. Hypnotherapy and therapeutic education in the treatment of obesity: Differential treatment factors. Psychiatric Quarterly, 1971, 45_' 234-254.

Wollersheim, J. P- Effectiveness of group therapy based upon learning principles in the treatment of overweight women. Journal of Abnormal Psychology, 1970, 76, 462-474.

- Wolpe, J, Reciprocal inhibition as the main basis of psychotherapeutic effects. Archives of Neurology & Psychiatry, 1954, *12*, 205-226.
- Young, E. A. The search for some answers. Paper presented at a symposium on obesity at The University of Texas Health Science Center, San Antonio, November, 1974,
- Zakus, G, and Solomon, M, The family situations of obese adolescent girls. Adolescence, 1973, *8*, 33-42.

APPENDIXES

- I. Family Task
- II. Structured Family Interview
- III. EF Group Raw Data
- IV. CF Group Raw Data

APPENDIX I: FAMILY TASK

TALK ABOUT AND PLAN A LARGE MEAL TOGETHER.

DECIDE:

1. Which meal will it be?
2. What foods will be served?
3. Who will do the shopping?
4. Who will pay for the food?
5. Who will cook the food?
6. Where will each family member eat the meal?
7. What time of day will the meal be eaten?
8. Who will wash the pans and dishes after the meal is over?

APPENDIX II: STRUCTURED FAMILY INTERVIEW

1. How much do people help and support each other in your family?
2. How easy is it for people to say what they think to each other?
3. How often do people get angry and argue with each other? Is it hard to solve problems in the family?
4. How often do people make their own decisions and do things for themselves?
5. How important is it for family members to compete and achieve things?
6. How often does the family talk about political, social or intellectual questions? Does anyone play a musical instrument?
7. How often do family members participate in sports, movies and recreation?
8. How much is the family involved in religious activities?
9. Does the family spend much time planning its activities?
10. Are there many rules in the family? Who sets the rules? Are they often broken? What happens when they are broken?

123456789101112131415161718192021222324252627282930313233343536373839404142434445464748495051525354555657585960616263646566676869707172737475767778798081828384858687888990919293949596979899100

Variable Measures

1HI.N0-3	o i n m o i n o i n o i n o o o i n r^ cor^r>m<Tiinr~-vDa30oocN
3H0-a	i n i n i n t n o o o o o o o m i n >* coi^cDCNCN'^'*p>-coinoo
1VH0W-S	6.0 i n m o i n o i n i n o o o i n o 6.0 coocTir^cTivDcNkOo^cTi^m
oan-a	1.5 o o i n o o i n m o o o o i n 1.5 OC^t^OOUDOr^CTiOCNrH
laiNi-a	4.0 o o i n o o o o o i n o o o 4.0 iHrHOOOrHOinCOOOO
AaiHDv-a	5.5 o o o o i n o o i n i n o c i n 5.5 <ricoa>cNrHr-r~o>X)CN':ri-i
daaNi-a	4.5 O i n o L n L n i n i n L n i n L n i n 4.5 O c o i n c N O - H n r ^ ^ O f N ' f l '
laNOD-a	5.0 o i n o o i n i n L n L n i n i n o o 5.0 ':j'CNinoor>-vDt^c^'^t^crico
Hdxa-a	6.5 O L n o i n o i n o i n i n o i n i n 6.5 ^r-iltTr-ir-ir-incnr^C^r-icn
NSD-a	7.5 o i n O L n i n i n i n o o o i n o 7.5 (Tiin<3^rnmr^r-ico<J>-'rHO
THJiNO-o	in^inrot^voincovor^'*'
3H0-S	r^i Tir^oovDeDincrin^
IVHOW-S	in c o c o i n v D e o c T i v D r ^ o o c ^ o o r o
Dan-s	cn rOO^VDCOOCOI^tnOO^CNrH
laiiNi-s	r- nt^ - ^ i n i n ^ i n r ^ o o v o m f N
AaiHDV-S	r^ u3r~LnvovovDvDooLncoinvD
daaNi-s	cn CQvDt^'^Dcoindr-^i^r^mkDr^
laNOO-s	rf l—irr^roro^i—iCNinromin
Hdxa-s	in Ln>;r'*t~-rovI>r>-vDCOrO<D<a'
NSD-S	in oot^invDincot^cotTiQOoo^
iNd #	ri r-<fNCNi-irHiH(NCN--!iHiHCN
Sod s	ri rHrOiHCNiHrHCNi-HCNiHtHrO
xas s	rH r-ir-iOr-ir-ir-ir-iCDr-{r-ir-{r-i
aov s	C^ o o r o i n n c r i o o r H c o ^ ^ v D c ^ ri ri ri ri r{ r' ri ri
NHQIHO #	ro t-HrOCNCNCNrOnf-ICNCOrHLn
sas	l- i o o o r h i h r - i o o o i h r h c
aova	iH Or-iCr-ir-ir-ir-i^ . r-ir-ir-ir-i
# rans	rH c^cnrfiriKDe^cocy^Or-iC'icn ,i ri ri ri

^ 0 2 0 X M M 1 4 0 4 i C 0 A

VE V O S > O A I

0 3 0 H 0 H

1HiN0-a 5.5 in in O o in in m m m o
 2.5 in ro VD vD t^ 'a* iX) ^ r- t^
 OHO-a o in o o in m o m m m o m
 cn in CO fN CN ro r^ rf r^ vD ro
 T^iow-a o o in o o o m m o m m m
 CO CD KD r^ 00 ro CV m vD r~
 oan-a o o o o in m o o o m o m
 O KD vD (T» r-i rH rH r- r-i KD ^ r-i
 laiNi-a o in in in o o m o o m c m
 CN 00 ro ro m fN 00 CN ^ ro r-i
 AaiHDv-a o in o o tn m o o o o c m
 CO CO in in «^ V r^ ^ r~ vD m
 daoNi-a in o o in in m m o o o m o
 CN r-i 00 CN ro CN r^ CN 'ST ro ro
 ^aNO^-a in in in o o o o m m m o m
 00 in rH ^ CO 00 C^ O r-> m vo vD
 HdXa-3 in in o in o o o o o m c m
 ri o (N 00 CN ^t rH r^ CN 'r ro oi
 Nso-a o in o in o m m o m m m m
 ro rH CO 00 VD 00 rH cn r^ m ^ vD
 THiND-S in CD «a CD in r^ r^ vD vD ro m 00
 DHO-S CN CO vD (Ti t^ CN m m vo r~ ^ t~
 IVHOW-S in <ti cTi r^ cti ro 00 CN 00 '* r^ C^
 oan-s r-i ro CO r^ in CN ro m ro m rf CN
 laiNi-s m r- vD in in CN m 00 vD vD m ro
 AaiHDV-S vD KD KD r^ ^ r^ m t^ m 00 ^ r-
 daoNi-s CO <D KD r~ vt r- 'Ar 00 r^ vD r- m
 laNoo-s ^ rH ^ '3' r- cti <? rH CN 'r ro ro
 Hdxa-s in cn r- cn in t^ c^ 00 m 00 ^ vD
 NSD-S ro CO o^ r- r-i r^ 00 rH r- CO vD i^
 iNd # (N rH CN CN r-i rH CN CN rH CN r-1 rH
 SOd S CO r-i r-i rr CN CN rH CN r-i r-i r^ cn
 xas s r-i r-i o r-i r-i r-i C> r-i CD r-i r-i ^
 aDV s r-i 00 in o in •^ vD •^ cn rH ro O^
 r-i r-i r-i r-i r-i r-i r-i r-i r-i
 NaaiHD # in rH rH ^ in ^ rH CN CN ro CN "A
 sas r-i o c o r-i rH C O rH O O rH
 aovH r-i r-i r-i o r-i r-i r-> r-i r-i r-i r-i
 # rans in VD r~ 00 cn o rH CN ro "Ar m
 r-i r-i r-i r-i r-i rH CN CN CN oi CN OJ

isOT 91 0 ' * 0 v D 0 0 0 0 f N 0 0 0 0
 ssas # OCnO'^rCNvOOOvDrHOOrH
 iMHAO % CN'O'cniHyDmoOOCNr-OOrOvD
 '^m'^VDeri^CNvD^CTiCNrO'3'

Tvaoid-ia o m m m o o o m m o o o o
 m vD m r r r^ 00 00 vD "Ht rO co 00 00
 AHiVdwa-ia o o o m m o o m o o m m m
 CN 00 rO CN rO ^ rO rO rO CN ^ 'a' '3'
 ajNOD-ia o o o m m m c o m o o o m
 ... '* 00 rO FN FN rO rO rO 'r CN FN r-i
 aoow-ia m o o m o m o m o m o m m
 r-i CN CN r-i '^ .^ CN OJ FN .-! .. >*' *
 Hdxa-ia o m o o o m m m o o m m m
 CN rO 00 rO '^ ^ rO ^ rO rO rO '* **
 wHad-ia o m o m o m o o m o m o m
 CN 00 rO CN .<T ^ CN »* FN CN ^ m .^
 SVANI-ia o m m m o m o o o o m o m
 '^ r-i CN rO rO r-i CN FN rO rO FN r-i 'a*
 dsan-ia m o o o o o m o o m o m o
 CN rO 00 rO ^ *a' rO .. rO OJ .. 'S' »*
 aias-ia m o o m o m m m m m m m o
 CN "r rO CN "r '* rO ^ FN OI '3' .. 'ST
 •LooaN-ia o o o m o o o o m m m o o
 CN rO rO CN ^ rf rO 'a' rO CN ^ .. m
 HiAW-ia o o o o m m o m o m o m m
 CN ^ rO CN rO .* rO .^ rO CN m .. *3'
 NSlD-ia o m o m m o o m o m m m m
 .. CN ^ »* FN CN CN FN >* .. OJ r-i r-i
 TVOD-ia o o o m m o o m o m o o o
 ^ rO rO .^ FN m rO r-i FN ^ OJ m FN
 nawod-ia o o m m m o m m m o m o m
 mroro«^rHCNrofNrorOrHfNrH
 rHCNrO^mvDr^OOCnOrHfNrO

ti B307 P O U Ti M M M M x o n z B B v

vH v o r u > u & . ' O H O i ' u B B

en (1) 3 en (0) q1 S q1 Xi (0) H B v

^ 22 a 2 2 X FV
 U P O 8 0 8 S 0 ^ E H ^
 U P O 8 0 8 S 0 ^ E H ^

V H H C X 3 3 A E E 3 A E E

THiND-a	o m o m m o m m o m o m o m cn m m m m r~ m m oJ m cn rf
DHO-a	m O o m o o o o o o m o m vD m m vD vD m vD m m r^
TVHOW-a	o o m o m m o m o o o m m 'a* CN r-i r-i ro ro vD ro '3' CN CN 'S' CN
D3H-a	m m o o m o m o m o m m o vD cn co vD co 00 vC 00
laiNi-a	m m o o m o m m o o m o m 00 vD 00 ro cn r> 00
AaiHDV-a	o m m o o m m m o m m m o vD co vD 00 co r^ vD co vD [^ co vD r^
daoNi-a	m o o m m o m m m m o m m 00 vo co vD co 00 m r^*
laNoo-a	o m m o o o o m o m m o m CN r-i oJ r-i 00 fN m oJ CN r-i r-i ro o
Hdxa-a	m m m m m m m o m m m m m vD co m m cn m co m r^
NSD-a	m o o m m m m m o m o m o 00 00 vD ro co 00 r^ CN
1HiN0-S	-* m vD vD m vD i- vD vD 00 m ^ vD
DHO-S	vD ro «3» m VO m .^ vD m ^ m vD vD
IVHOW-S	fN ro r-i CN 00 ^ m ro ro r-i r-i ro o
D3H-S	00 r- vD 00 r- 00 ^ r- vD r- 00 m 00
laiNi-s	[~ co r- cn co co m 00 vD <n vD r- cn
AaiHOV-S	00 en 00 r^ [^ 00 vD 00 vD co oi r- 00
daoNi-s	co r- r- cn r- co vD r^ r^ 00 00 00 cn
laNOO-s	'3' CN ro fN CM ro [^ CN ^ o) 00 ^ rH
Hdxa-s	r> cn vD cn vD r^ m <n vD 00 t^ vD <n
NSO-S	ro fN .^ r-i 00 fN vD CN 00 r-i oJ ^ rH
iNd #	fN r-i CN fN r-i r-i r-i CN r-i r-i r-i r-i CA
SOd S	CN r-i fN r-i oJ r-i r-i CN r-i rH r-i oJ ro
xas S	r-i r-i r-i o r-i r-i rH r-i o r-i ri rH rH
aDV s	cn o cn fN m cn cn (n o co vD m r^ r-i r-i r-i r-i r-i r-i r-i rH
NHQIHO #	•^ r-i oJ CN CN cn fN ro r-i fN fN CN m
sas	r-i o o o r-i r-i r-i O o o rH rH C
aD\fh	r-i o r-i o r-i r-i r-i r-i r-i r-i rH rH
# rans	r-i CN ro " ^ m vD [^ 00 0^ O r-i oJ ro r-i r-i rH rH

T3
 1
 H X M O N B i B
 V

V H V O S < B a o S B B B D

S R H e S O R 2
 r H
 • H
 V e S V

ivaoid-ia	m m o o m o o o m o m fN fN rO fN rO 00 fN " ^ rO fN rO rO
iiHiVdwa-ia	m m o m m o m m m o m m fN rH CN CN CN fN rH CN fN CN CN fN
laNOD-ia	o o m o o m o m o m o m - ^ • ^ rO . . ^ 00 . . 00 • ^ r r ' s t ' rO
aoow-ia	o m o o o o m m o m o m fN rH rH rH fN fN rH CN OJ rH CN CN
Hdxa-ia	o m o o m o m m m o m m OJ rH CN rH fN fN rH rO rH OJ CN CN
wnad-ia	m CD m o o o m o m o m o CN OJ ON CN OJ OJ fN fN fN CN fN 00
SVANI-ia	m m o o m o m o m o o m rO r r ^ m rO f ^ ' S ' rO . . * S T 00
dsan-ia	o o m m o o m o m m o m rO fN CN rH CN fN rH CN fN rH CN fN
aias-ia	m o o CD m m CD m o m o o fN OJ CN rH fN rH rH OJ CM rH CN CN
iODaN-ia	o m m m m o m m m o m m fN fN fN rH fN fN rH fN CN CN OJ CN
HiAW-ia	o o m CD o o m o o m o m CN rH rH rH fN fN rH rO 01 rH CN CN
Nsno-ia	m m m m m o o m o m o m • ^ • ^ ^ . . • ^ . . ' p rO • ^ • ^ * ^ ^
ivoo-ia	o o m o m m o m o m m o • ^ • ^ rO m rO ' a - m ' ^ " ^ * rO ' a '
HaMOD-ia	o m o o o m o o o m o m ^ ^ ' ; r m " : 3 ' r o m ^ ' ; j ' ^ T 3 ' o o
# rans	' ^ r m v D c ^ o o c n O r H o i o o ' ^ m r H r H r H r H r H r H O g C N C N C N O J f N

