PERSONALITY TRAIT MODIFICATIONS ACCOMPANYING CHANGES IN BODY COMPOSITION OF OBESE WOMEN PARTICIPATING IN A WEIGHT CONTROL PROGRAM

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Chapter 1

INTRODUCTION

In recent years, an increasing number of physical educators have focused attention on developing a scientific foundation for the psychophysical values of muscular activity. Research in this area, however, has been narrowly limited to the relationship between personality dynamics and athletic participation, and the findings thus far have proved to be either inconclusive or contradictory (25). The major criticism of these studies has been the nonexistence of any theoretical basis to justify the investigation of such a relationship (25, 40, 47, 52). Experiments have been purposed towards solutions to specific problems and this has resulted in random fact gathering. These same facts could potentially be interrelated in meaningful ways to suggest causal association if the research problems were closely tied to existing theory and evaluated as the next logical step to increasing understanding.

The question arises, then, if this psychophysical relationship is of interest and concern to physical educators, why not build upon the theoretical framework established by other disciplines?

Young (63) has described obesity as "... the number one unconquered nutritional problem in the United States."

Mayer (39) portrays obesity not only as a nutritional problem, but a national obsession. Mass communication media redundantly offer slenderizing hints and dietary advice. Millions of dollars are spent each year on memberships in reducing salons, diet pills, low-calorie foods, exercise gadgets, and other fadisms. The fat person today is unquestionably the subject of both condemnation and concern (1).

Within the past century, understanding of the clinical and physiologic aspects of obesity has increased appreciably. At the same time, recognition of the complexity and interdependency of the central nervous system and the socio-cultural environment of man has resulted in presumptions that emphasize the psychologic foundations of obesity (39). Therefore, in an organic disturbance (such as obesity) the emotional, as well as the physiological, forces at work must concomitantly be considered.

The purpose of this study is to investigate the relationship between personality (measured in terms of two primary, independent dimensions) and changes in body composition; more specifically, are psychological modifications ancillary effects of weight reduction or must psychological integration precede increases in the lean body mass:fat ratio?

Chapter 2

REVIEW OF THE LITERATURE

Personality of the Obese

A personality description of an obese adult female (in contrast to an adult non-obese female) reflecting psychoanalytic theory (6, 10, 32, 46) would depict her as: (1) being more anxious (32); (2) having deeper repressions (32); (3) possessing more rigid ego boundaries (32); (4) displaying a blurred sense of reality (19, 32); (5) exhibiting greater disturbances in body image (32, 54); and (6) possessing a megalomanic self-image (34)--however, while feeling superior and misinterpreting one's own importance in the world, there still exists an underlying fear of nothingness.

In the early 1950's, the Herrick Study (51) was conducted in Berkeley, California. Suczek (55) reported three findings from personality test data and observations of one hundred obese women. (1) A measure of anxiety revealed that 70 percent of the obese subjects were statistically within normal limits. (2) When compared with each other, the overweight women differed markedly in personality and psychological functioning. When compared as a group with other homogeneous groups, however, 90 percent of the obese women tended to be strong, dominating, and independent

in their relationships with others (6, 34, 56). Also the obese woman tended to be ambivalent in her feelings about herself (6). (3) Obese women are not motivated to accept psychiatric treatment even though they may have serious emotional problems.

In the Herrick Study, when evaluations were made by using the Interpersonal System of Personality Diagnosis (34) and a description achieved at each of three levels of personality--overt behavior, self-description, and preconscious fantasy--it was found that the obese women, when reviewed as a group, present "... a triple-level facade of power-oriented personality." Narcissistic strength and interpersonal dominance (6, 55) characterized a majority of the obese women and distinguished that group from other symptom groups.

Other studies have shown obese subjects to have an underlying tendency to depressive illness (32, 35, 58); to present themselves as "hypernormal" (58); and. to be hypersensitive (19) and unwilling to perform self-evaluations (58).

Finally, Levitt and Fellner (36) developed a profile for three obesity subgroups. Twenty-eight obese women were administered a brief psychological battery including the Minnesota Multiphasic Personality Inventory, the scales of which measure the degree of emotional disturbance. The etiology of the obesity of each subject was also classified according to Gordon et al. (21). The psychogenic group

showed the greatest elevation of the three groups on ten of the thirteen MMPI scales. The metabolic group and the mixed group showed considerable overlap and fell largely within normal limits.

Predicting Dieting Success

During the 1950's, a series of dietary experiments conducted by Darling, Summerskill, Young, and others (14, 57, 64, 65) resulted in the following conclusions: (1) Obesity may be associated with varying states of emotional adjustment from essentially normal to seriously disturbed. Young et al. (64) further classified the subjects according to three groupings: "(a) patients who appear reasonably stable with little or no emotional problems; (b) persons who gave repeated evidences of being tense, anxious, or insecure, and (c) patients who appeared to have fairly deep emotional problems." (2) Neither psychiatric interviews nor psychological testing revealed any single or unique personality pattern among the poorly adjusted subjects. (3) A high positive relationship existed between emotional adjustment scores and dieting performance.

Shipman and Plesset (50) were also concerned with predicting dieting success. They found the following factors to be predictive of dieting outcome: (1) initial anxiety and depression levels; (2) marital status; and (3) success in the first-time unit of the diet. At the conclusion of the study,

the concept of "delayed effect" was emphasized. The effects of initial anxiety and depression are greatest for those individuals dieting for four or more visits, thus suggesting that the early stages of dieting are not as difficult as the later stages. "We now feel that only by the end of a month of intense dieting do the personality factors start to influence dieting success. Prior to that time, the weight loss is apparently not large enough to be physically or psychologically stressful."

Resistances to Reducing

Kotkin (31) describes a secondary gain as "... a symptom which proves to be of some advantage to the patient despite the fact that the primary disadvantage of the symptom may be painful or troublesome." Obesity may be just such a secondary gain for many overweight persons--overeating can be a meaningful, goal-oriented process. In keeping with this theme that self-defeating habits do serve a purpose in a person's economy (5), Conrad (13) has identified some of these "inner resistances to reducing." They include: health, lack of knowledge, identification, resistance to dieting, maturity, emotional insecurity, personal self-regard, and sexuality.

To summarize:

1. Obese persons, as a group, share certain personality characteristics which differentiate them from non-obese;

however, it has not been demonstrated that the obese differ psychologically from other intake symptom groups (smokers, alcoholics, et cetera).

2. Among obese individuals it is possible to predict success with controlled dietary and activity schedules by using objective psychological tests and/or interviews.

3. It is possible to individualize treatment (and thereby increase reducing success) if the specific "resistances to reducing" can be identified.

Assessing Body Composition

In quest of a practical, yet accurate method of estimating body density and total body fatness, Seltzer, Goldman, and Mayer (49) conducted a series of medical and anthropometric examinations on 32 white, obese (otherwise healthy), adolescent girls.

A study of the relationships among body density and body weight, and anthropometric and skinfold measurements revealed a high correlation between body density and upper arm circumference ($r = -0.632$) and between body weight and upper arm circumference ($r = 0.901$). A high correlation was found between body weight and the triceps skinfold ($r = 0.795$) and the pectoral skinfold ($r = 0.784$). The triceps skinfold provided the highest correlation value with body density ($r = -0.687$, $p < 0.01$).

In conclusion, it was suggested that the triceps skinfold, which is the easiest to measure, is also the most representative of total body fatness among obese adolescent girls.

The Criterion for Obesity

Seltzer and Mayer (48, 38) have shown that caliper determinations of the triceps skinfold thickness (the most accessible, particularly on corpulent subjects) permit a "... clear definition of obesity and a satisfactory assessment of its extent." Since the relation of skinfold thickness to body fat content is independent of height, it is possible to establish a single value for each sex and age as the minimal limit of obesity. While establishing such a cutoff point is arbitrary, Mayer (38) did suggest that a woman may be described as definitely obese if her total fat content is in excess of 30 to 35 percent. Redefined on the basis of skinfold thickness, a woman is obese if her triceps skinfold thickness is greater than 25 millimeters.

Assessing Personality

The Eysenck Personality Inventory (18) was devised as an efficient means of quantitatively assessing personality in terms of two primary, independent dimensions: (1) extraversion-introversion, and (2) neuroticism-stability. These major dimensions have been identified through use of factor analysis (22). "Briefly, extraversion as opposed to

introversion, refers to the outgoing, uninhibited, impulsive and sociable inclinations of a person. Neuroticism refers to the general overresponsiveness, and liability to neurotic breakdown under stress." The Inventory also includes a Lie Scale which may be used to detect response distortions (or, "faking good"). In general, low neuroticism scores and middle to above average extraversion scores characterize "better adjustment." The repeat reliability for Form A (time elapse of nine months) is E = 0.97 and N = 0.88.

Effecting Changes in the Body Composition of Obese Subjects

Dempsey (15) analyzed body composition changes in overweight men (differing in degrees of obesity) participating in eight weeks of training, followed by five weeks of normal activity and five more weeks of training. It was found that: (1) daily caloric consumption remained unchanged (27); (2) body weight loss during the training phase was attributed to a "... reduction of subcutaneous and total body fat and, to a lesser extent, an increase in FFW--presumably mainly muscle"; (3) during the phase of decreased or normal activity the above mentioned variables either "... continued to change in the same direction but at a substantially reduced rate (43), were resistant to further change, or reversed the pattern of change previously observed during training"; and (4) neither rate of body weight loss or fat loss was dependent upon the initial degree of obesity (4)

although gain in fat-free weight was related to the amount of excess fat being carried.

Boileau et al. (4) compared body composition changes of eight obese and fifteen lean college men participating in a nine week moderate exercise program. Body weight decreased significantly for the obese group; however, for both groups there was a decrease in fat weight (a significant decrement in total skinfold thickness) with a concurrent increase in fat-free weight.

The results of studies on obese women are in accord with these findings on obese men. Moody et al. (41) assessed and evaluated the effects of a moderate exercise program on body weight and fatness of eleven overweight college women. It was found that body weight and total skinfold thickness decreased significantly. Calculated body composition changes revealed a decrease in fat weight and an increase in fat-free weight.

Dudleston and Bennion (17) investigated the effects of diet and exercise on twelve obese college women. The subjects were divided into four groups: Group I--consumption of a 1200 calorie diet and participation in an exercise program; Group II--consumption of a 1200 calorie diet only; Group III--participation in an exercise program only; and Group IV--neither consumption of a low calorie diet nor participation in an exercise program. It was concluded that "... a combination of regular dynamic exercise and caloric

restriction work together for greater weight loss, a greater feeling of physical well-being, better control of water retention, a more positive mental attitude, and a more pronounced reduction of serum triglyceride and cholesterol levels."

Chapter 3

STATEMENT OF THE PROBLEM

The rationale for the present study is as follows:

If all obesities can be controlled by creating a negative energy balance;

And, if initial emotional adjustment effects motivation and, in turn, success in adhering to dietary and exercise schedules;

Then, (a) over a 16 week period, obese individuals scoring within the "normal adjustment" range on the EPI will show little change in personality but will achieve a reduction in body weight and a change in body composition; (b) as initial personality scores gravitate away from "normal," changes in personality toward "better adjustment" will accompany a lesser reduction in body weight and change in body composition; (c) those obese persons scoring "abnormally" on the initial personality test will be expected either to drop out of the program or to remain the entire 16 weeks and exhibit a positive change in personality with little or no change in body composition.

Definition of Terms

1. Positive change in body composition: A decrease in body weight and a reduction of the triceps skinfold

thickness were indicative of a reduction in the percentage of total body fat.

2. Personality classifications: Because of the relatively small number of subjects (N = 25), only two subgroups for each personality dimension were arbitrarily determined. On the neuroticism-stability (N-S) scale, those scoring above the calculated mean were categorized as "neurotic"; those scoring below it were categorized as "stable." On the extravert-introvert (E-I) scale, the "extraverts" scored above the calculated mean, the "introverts" below it.

The Hypotheses

From the general statement of the problem, eight specific null hypotheses were developed to be statistically tested:

1. There will not be a significant difference between pre and post body weight measurements.

2. There will not be a significant difference between pre and post triceps skinfold thickness measurements.

3. There will not be a significant difference between pre and post neuroticism-stability scores.

4. There will not be a significant difference between pre and post extraversion-introversion scores.

5. There will not be a significant relationship between the initial N-S score and a change in body composition.

6. There will not be a significant relationship between the initial E-I score and a change in body composition.

7. There will not be a significant relationship between the initial N-S score and a change in neuroticism-stability.

8. There will not be a significant relationship between the final N-S score and a change in body composition.

Chapter 4

METHODS AND PROCEDURES

The Subjects

The subjects used in this study were obese women who had voluntarily enrolled in a physical education class "Body Shoppe" at Laney College (Table 4.1). It may be assumed that these women are somewhat representative of a larger population of obese women who voluntarily enroll in community college weight control programs.

Table 4.1

Physical Characteristics of Subjects Prior to Initiation of the "Body Shoppe" Program

N = 25	Age	Height (in)	Weight (lbs)	Triceps Skinfold Thickness (mm)
Mean	25.76	63.64	161.88	31.20
SD	10.74	2.01	27.87	8.95

The Program

The physical education class "Body Shoppe" is a special program for obese women. It is a one semester course that may be repeated for credit for a total of four semesters. A minimum of two hours per week are devoted to physical exercise and conditioning and, depending upon group/individual needs, the remainder of the time is spent in information-giving sessions and discussions, medical consultation,

individual and group counseling, and self-supervision activities.

Variables Under Consideration

In this study, the dependent variables were body weight, triceps skinfold thickness, and two dimensions of personality. The independent variables included eating behavior, energy output, group process, and individual growth.

Body weight. Body weight determinations were made to the nearest pound. Subjects were measured without shoes but with clothing.

Triceps skinfold. The Lange Skinfold Caliper was used to measure the thickness of the triceps skinfold. The procedures are described by Seltzer and Mayer (48). The dial was read to the nearest 0.5 millimeter. If the folds were extremely thick, dial readings were made three seconds after applying the caliper pressure. Caliper applications were made twice and the measurements were then averaged (the reliability coefficient was $r = 0.99$).

Personality factors. The "Eysenck Personality Inventory" was used to assess personality in terms of extraversion-introversion and neuroticism-stability. Form A was administered to all subjects.

Eating behavior. Initially, each subject was asked to keep a complete record of her own personal eating behavior between the first and second class sessions. This would

include noting what was eaten, when, where, and with whom. Subjects were asked not to deliberately modify eating behavior. This record was turned in at the second class meeting.

After a medical consultation, at which time the college physician recommended a daily caloric intake for each subject, the group met for two information-giving sessions (one hour each). When the group admittedly had a basic understanding of "balanced, de-calorized" eating behavior, they were asked to keep a diary for the entire semester and to record everything that is eaten, the size of the portions, and the number of calories. This diary was to be turned in at the end of the course. A spot check was made once a month (a total of four) and during a class period, each subject was asked to copy from her diary, and to turn in, the record of the previous day's eating behavior.

For this study, the eating behavior of each woman has been subjectively evaluated and arbitrarily assigned a score of one, two, or three. A score of one indicates that an individual showed no change in eating behavior from the initial report to the end of the course. A score of two indicates that conscious effort was made to change eating habits, but the change was inconsistent. In most cases, the subject selected a better balance of food, but caloric intake varied. A typification of such eating behavior would be adherence to a dietary regimen for days at a time, then a

relapse, followed by an attempt to again reduce caloric intake. Those subjects receiving a score of three were able to maintain a dietary schedule throughout the 16 weeks. The eating behavior is characterized by inclusion of the "basic four" food groups and a consistently lower average caloric intake.

Energy output. The "Body Shoppe" class was designed to insure a minimum of two exercise periods per week (approximately 40 minutes in length). Attendance is required at these sessions and, in addition, students are encouraged to exercise daily.

While a subjective evaluation of energy output is statistically untenable, due to medical restrictions and the subsequent need to include a variety of activities, this became the most feasible method of grouping the subjects.

After the initial medical consultation, at which time the college physician recommended light, moderate, or heavy physical activity, each subject was required to participate in an activity of her choice (walking, jogging, swimming, et cetera). During the first exercise session and once a month for the duration of the course (a total of four) everyone was "timed" for a designated distance in her particular activity. On rainy days the entire group participated in an indoor circuit training program (60) although not all of the women were able to do all of the exercises.

The subjective rating scores of one through three were assigned primarily on the basis of attendance and participation. A score of one indicates that a subject attended less than 50 percent of the exercise sessions, consistently arrived late, and/or put very little effort into her performance. Those receiving a score of two attended at least 50 percent to 75 percent of the exercise sessions, but did only that which was required. To receive a three, a subject attended over 75 percent of the exercise sessions, adhered to her personal exercise program, enrolled in other physical education classes, and/or reported increased activity outside of class.

Group process. There are approximately 15 group counseling sessions each semester. The first meeting is used for pre-testing and for making arrangements for both medical examinations and individual counseling appointments. The second meeting is a general orientation session during which the procedures, objectives, goals, and other miscellaneous benefits of the program are explained. Also, the immediate concerns and/or questions of individuals within the group are discussed. The third encounter focuses on the value of attaining optimal physical health--the physiological effects of exercise in relation to body composition and on the potential physical and emotional dangers of obesity. The fourth and fifth sessions are primarily discussions of nutritional information, including a presentation of strategies to

develop a balanced, decalorized eating program tailored to individual needs. The remaining ten meetings are typical sessions in group process wherein a non-threatening environment is provided to enhance both group and individual growth.

The group process is viewed as an integrating factor conducive to unmasking the significance of the variegated experiences and manifold feelings that are constantly changing, but continuously confronting the individual group members each week. A repertoire of group techniques is introduced by the counselor at appropriate times to facilitate group movement or to guide the discussions toward any areas of course content deemed necessary by the staff. Throughout the 16 weeks, the counselor is able to capitalize on the interplay between group and individual counseling sessions in order to maximize both individual and group growth and development.

The score for the program element "Group Process" were again subjectively assigned. A score of one is indicative of poor attendance (less than 50 percent of the group sessions), a lack of sensitivity to one's own feelings or to the feelings of others, and/or an inability to recognize problems related to one's self, there were definite attempts to engage in problem solving and a willingness to modify strategies in order to cope with new situations. A score of three indicates a combination of two or more of the

following: attendance at over 75 percent of the group sessions; a highly developed sensitivity to one's own feelings and the feelings of others; an ability to identify problems related to one's self; engagement in meaningful problem solving tasks; a notable improvement in the ability to withstand tension, frustration, or disagreement; sincere attempts to devise new strategies in order to cope with new situations; a commitment to the group activities; and/or a willingness to accept one's own responsibilities and an acceptance of the right of others to be different.

Individual growth. During the first week of the course, each student is required to set up one individual counseling appointment. While the purpose of this initial appointment is to take the "Obesity Q-Sort Inventory" (42) it is hoped that the women will return for an interpretation of their test results and then voluntarily continue with the individual counseling sessions on a regular basis. It is felt that a forced counseling relationship would only create a threatening environment, or foster resistance to change and feelings of insecurity, all resulting in minimized opportunity for self-growth and direction. Contrarily, persons tend to develop a "counseling readiness" (recognition of the relevance of the counseling experience to one's own goals, i.e. weight loss). Until this readiness occurs it is difficult, if not impossible, for clients to openly explore and communicate their innermost feelings and attitudes relating

obesity or any other personal concern deemed detrimental to one's sense of well-being.

The subjective ratings of one, two, or three tend to reflect the degree of personal involvement in the individual counseling sessions. A score of one is indicative of attendance at a minimal number of individual counseling sessions (less than five); lack of understanding of the potential dangers of obesity, or of the values of proper nutrition and exercise; little or no motivation to propose, plan, or adopt any particularly effective behavior leading to weight loss; and/or little or no movement from discussing "safe" informational material in contrast to dealing with one's feelings and attitudes concerning obesity. A score of two indicates average attendance (five to ten individual counseling sessions); an adequate knowledge of the potential dangers of obesity and of the values of proper nutrition and exercise; a developing awareness of the causes of one's own obesity; an increasing degree of motivation to propose, plan, or adopt any effective behavior leading to weight loss; recognition of the need to become self-disciplined and self-directing; and/or a gradual movement from a discussion of "safe" informational material toward revelation and analysis of feelings and attitudes concerning obesity. To receive a score of three, an individual displayed any given combination of the following: attendance at over ten individual counseling sessions; thorough understanding of the potential dangers of obesity

and of the values of proper nutrition and exercise; profound insights into the causes of one's own obesity; commitment to change behavior in order to effect weight loss; acceptance of the need to be self-disciplined and self-directing; an increasing ability to synthesize information, insights, aspirations et cetera into effective behavior; and/or appropriate and comfortable shifts back and forth between informational content and one's feelings and attitudes concerning obesity.

The Experimental Design

The experimental design used in this study was a modification of the one-group pretest-posttest design. The dependent variables were changes in body composition and/or personality and the independent variable was a 16 week period of time, more specifically, participation in the weight control program (Figure 4.1).

Pretest	16 weeks	Posttest
body weight	"Body Shoppe"	body weight
triceps skinfold	eating behavior energy output	triceps skinfold
personality	group process individual growth	personality

Figure 4.1

The Experimental Design

Body weight, triceps skinfold thickness, and personality factors were measured twice, at the beginning and again at the end of the 16 week program. The subjective assessments of each individual's success with each of the four program elements were determined on the day preceding the final physical and psychological measurements.

Chapter 5

RESULTS AND DISCUSSION

Data were collected on only those subjects who completed the 16 week program (Table 5.1).

Table 5.1

Summary of Initial and Posttest Determinations for Physical and Psychological Variables

N = 25	Initial	Post	Diff.	t
Body Weight (lbs)				5.312*
Mean	161.88	156.36	5.52	
SD	27.87	25.0	5.09	
Triceps Skinfold (mm)				5.090*
Mean	31.20	28.56	2.64	
SD	8.95	7.87	2.52	
Extraversion-Introversion				0.161
Mean	11.08	11.16	+.08	
SD	3.08	3.12	2.43	
Neuroticism-Stability				2.196*
Mean	12.08	10.56	1.52	
SD	4.39	4.76	3.39	

*Required for significance at the 0.05 level t = 2.064.

Correlation Between Measures of Body Composition

Correlations between body weight and triceps skinfold thickness were calculated for the initial and post measurements and for the change in body weight and triceps skinfold thickness (Table 5.2).

The correlation between initial body weight and initial triceps skinfold thickness was r = 0.7416. This is

Table 5.2

Correlations Between Measures of Body Composition: Body Weight and Triceps Skinfold Thickness

	Initial	Post	Change
r =	0.7416	0.7157	0.5113
t =	5.301*	4.917*	2.851*

*Required for significance at the 0.05 level t = 2.064.

only slightly lower than that reported by Seltzer et al. (49) for obese adolescent girls (r = 0.795). At the same time, Seltzer et al. (49) recommended a regression equation for the prediction of body density and subsequently, percent body fat, from the triceps skinfold measurement; however, the equation has not been used in this study because of the age variability (29, 59, 67) of the subjects (a range of 18 to 51). The triceps skinfold measurement, expressed in millimeters, was used to indicate the degree of obesity and to assess the loss of subcutaneous fat.

The correlation between post measures of body composition was r = 0.7157. Studies by Young et al. (66) and Sloan et al. (53) have shown that for non-obese women the triceps skinfold thickness alone is not a reliable predictor of body density (r = -0.5210, in contrast to r = -0.687 for obese adolescent girls). The reduction, then, from r = 0.7416 to r = 0.7157 is consistent with these previous findings since both the mean body weight and mean triceps

skinfold thickness for the group decreased significantly, that is, the group became less obese.

The correlation between the change in body weight and the change in triceps skinfold thickness was r = 0.5113. It is evident that either (1) the correlation of delta scores possibly eliminated individual differences, or (2) in accord with other investigations (9, 26, 44), loss of body water accounted for much of the early weight loss and would not be reflected in the triceps skinfold measurement.

Changes in Body Composition and Personality

During the 16 week period both the average body weight and the mean triceps skinfold thickness decreased 3.40 percent and 8.46 percent respectively. Since these differences were significant at the 0.05 level (5.1), null hypotheses #1 and #2 are rejected. It is concluded that there was a significant reduction in both body weight and triceps skinfold thickness.

The mean neuroticism stability score decreased 12.58 percent (directionally, toward stability). This difference was significant at the 0.05 level. Null hypothesis #3 is, therefore, rejected and it is concluded that there was a significant reduction in the N-S score, the group became more "stable." The slight increase in the extraversion-introversion score (toward extraversion) was not significant. Null hypothesis #4, there will not be a

significant difference between pre and post E-I scores, was accepted.

These results indicate that during a 16 week period a group of obese women were able to effect positive changes in both measures of body composition and in one dimension of personality. There was a loss of subcutaneous fat because of adherence to an exercise (4, 15, 41, 61, 43, 8) and/or dietary regimen (17, 28, 9, 16, 39, 59), and an abatement of neuroticism assumingly because of participation in the individual and/or group counseling sessions. The extraversion-introversion score remained unchanged because neither the therapeutic aspects of the counseling sessions nor the methodology of the overall program were oriented toward this personality dimension.

Relationship Between Personality Dimensions and Changes in Body Composition

The specific interrelationship of personality factors and the occurrence of positive changes in body composition were examined (Tables 5.3 and 5.4). The correlations between the initial N-S score and loss of body weight ($r = -0.2266$) and between the initial N-S score and decrease in triceps skinfold thickness ($r = -0.3147$) indicated the presence of a negative relationship between the two variables; therefore, to elucidate this relationship, an additional analysis was performed.

Table 5.3

Relationship Between Initial E-I Score and Changes in Body Composition and Personality

	E-I = 5-11 (N = 13)	E-I = 12-17 (N = 12)	t*
Weight Change (lbs)			0.9661
Mean	6.46	4.50	
SD	5.44	4.70	
Skinfold Change (mm)			0.5952
Mean	2.93	2.33	
SD	3.25	1.47	
N-S Change			0.3262
Mean	1.31	1.75	
SD	4.11	2.56	

*Required for significance at the 0.05 level t = 2.069.

Table 5.4

Relationship Between Initial N-S Score and Changes in Body Composition and Personality

	N-S = 3-12 (N = 13)	N-S = 13-21 (N = 12)	t
Weight Change (lbs)			2.369*
Mean	7.62	3.25	
SD	5.42	3.70	
Skinfold Change (mm)			3.170*
Mean	3.92	1.25	
SD	2.78	1.18	
N-S Change			0.4307
Mean	1.23	1.83	
SD	3.06	3.83	

*Required for significance at the 0.05 level t = 2.069.

Table 5.4 presents a comparison of the mean changes in both measures of body composition for two groups, based on the initial N-S scores. Group I, or the "stable" group, consisted of 13 subjects scoring between three and twelve on the initial N-S scale (scores below the calculated mean); group II, the "neurotic" group, consisted of 12 subjects all scoring between 13 and 21 on the initial N-S scale. The stable group showed a larger decrement in body weight (4.59 percent) and triceps skinfold thickness (11.78 percent) than the neurotic group (2.06 percent and 4.59 percent respectively). These differences were significant at the 0.05 level. On the basis of this data, null hypothesis #5 is rejected. It is concluded, then, that those individuals who were initially more stable were able to effect significantly greater reductions in both body weight and triceps skinfold thickness than the more neurotic group. This is consistent with other investigations that have established the existence of a high positive correlation between emotional adjustment scores and successful dieting performance (14, 57, 64, 65).

Evidence to support this conclusion is set forth in a study by Knapp (30). He found that "neuroticism" was significantly, negatively related to the personality construct "self-actualization" as conceptualized by Maslow (37, 12).

> Self-actualization is defined as "... ongoing actualization of potentials, capacities, and talents, as fulfillment of mission (or call, fate, destiny, or

> vocation), as a fuller knowledge of, and acceptance of, the person's own intrinsic nature, as an unceasing trend toward unity, integration or synergy within the person."

That is, more neurotic individuals are less able (1) to integrate a hierarchy of values/goals and the resultant behavior to effect weight loss; and/or (2) to assert the "inner controls" of self-discipline which are necessary to achieve the expressed desire to lose weight.

Initial extraversion-introversion score was unrelated to changes in either measure of body composition (Table 5.3). Null hypothesis #6, there will not be a significant relationship between the initial E-I score and a change in body composition, is accepted.

Initial N-S Score and N-S Change. It was stated that the more neurotic individuals might be expected to "... exhibit a positive change in personality with little or no change in body composition." That is, a linear relationship between the initial N-S score and the degree of change toward stability was expected. Such a correlation was $r = 0.2610$. Although the presence of a positive relationship was indicated, a comparison of the mean N-S change (the difference between pre and post scores) of the two groups previously described showed no significant difference (Table 5.4). On the basis of this data, null hypothesis #7, there will not be a significant relationship between the initial N-S score and a change in neuroticism-stability, is accepted.

It would appear that either (1) the therapeutic process effected both groups equally, or (2) there was a significant difference in variability of change. Based on a review of psychotherapy research findings, Bergin (3) concluded that psychotherapy can, and in some cases does, increase pathology; he termed this "the deterioration effect." Heslet (24) suggested that this area of deterioration effect also include the variable of spontaneous change, wherein environmental influences outside of the therapeutic process could result in deterioration. Persons attempting weight control are notably susceptible to this deterioration effect since overeating and obesity have been shown to be important adaptive measures to maintain equanimity (5, 6, 7, 13, 23, 31, 62, 64, 65). Bruch (6) concluded that in spite of the handicaps of obesity, overeating may be relatively harmless insofar as it serves as a protection against a more serious mental disturbance. Brosin (5) stressed the importance of replacing food, once it is removed, with a constructive, yet acceptable, satisfaction. Stunkard and Mendelson (54) summarized the difficulty of the problem when neurosis is entwined with obesity, "... this is the only condition which involves at the same time a disturbance in bodily integrity and a disturbance in impulse control. Both of these problems are serious enough when they occur separately, but their simultaneous occurrence makes each more malignant."

In light of this alternate explanation, the same correlation between initial N-S score and the N-S change was determined for the subjects, except that those who had increased neuroticism were excluded. This correlation was $r = 0.3906$ ($p < 0.05$). A comparison of the mean N-S change between the initially "stable" and the initially "neurotic" groups (excluding those subjects who had increased neuroticism) revealed that group I, the "stable" group, reduced the neuroticism-stability score by 2.50 ± 1.78; group II, the "neurotic" group, reduced the N-S score by 4.13 ± 1.96. Although not significant at the 0.05 level, the magnitude of each statistical relationship was increased.

Post N-S score and change in body composition. On the basis of post N-S scores, subjects were again divided into two groups, those scoring below the calculated mean (two through ten, N = 14) and those scoring above it (eleven through nineteen , N = 11). The t values for differences between independent means on both measures of body composition were not significant (Table 5.5). Null hypothesis #8, there will not be a significant relationship between the final N-S score and a change in body composition, is accepted. It can be concluded that as neuroticism is reduced (the mean reduction of the N-S score for the entire group was significant at the 0.05 level--Table 5.1) it becomes less influential as a factor in one's ability to effect positive changes in body composition.

Table 5.5

Relationship Between Post N-S Scores and Changes in Body Composition

	N-S = 2-10 (N = 14)	N-S = 11-19 (N = 11)	t*
Weight Change (lbs)			1.466
Mean	6.79	3.91	
SD	5.32	4.50	
Skinfold Change (mm)			0.217
Mean	2.75	2.50	
SD	2.11	3.07	

*Required for significance at the 0.05 level t = 2.069.

Interrelationship of Program Elements

During participation in the 16 week program "Body Shoppe," a group of obese women were able to decrease body weight, decrease triceps skinfold thickness, and to increase stability as measured by the EPI. It might be of value to attempt to ascertain which of the elements of the program were related to these changes (Table 5.6). Each subject was subjectively assigned to one of three groups, depending upon her success within each of the four program elements. The Kruskal-Wallis One-Way Analysis of Variance by Ranks (33) was the statistical procedure employed to determine if a relationship existed between any two variables.

The analysis of variance revealed only four significant interrelationships: (1) eating behavior and weight change, (2) group process and weight change, (3) individual growth and weight change, and (4) eating behavior and initial

Table 5.6

Interrelationship of Program Elements

	Ranking Variables			
	Eating Beh.	Energy Output	Group Process	Ind. Growth
Weight Change	14.54*	2.93	9.35*	12.47*
Skinfold Change	4.88	2.99	0.77	3.34
Initial N-S Score	6.03*	2.04	1.87	0.30
N-S Difference	1.98	4.68	2.49	3.80

*Required for significance at the 0.05 level H = 6.0.

N-S score. In addition, however, other directional trends were noted. Although not meeting the usual criterion of statistical significance (p = 0.05), these trends are sufficiently important to be discussed descriptively and should prove valuable in establishing a foundation for future, more precise research.

Figure 5.1 represents the mean and standard deviation weight loss (lbs) for the three subjectively differentiated groups in each of the four program elements. H values show three of the elements to be significantly related to body weight loss at the 0.05 level (Table 5.6). In short, (1) those subjects who were able to consistently modify eating behavior lost most body weight; (2) those exhibiting the greatest degree of personal involvement in the individual counseling sessions lost most body weight; and (3) those

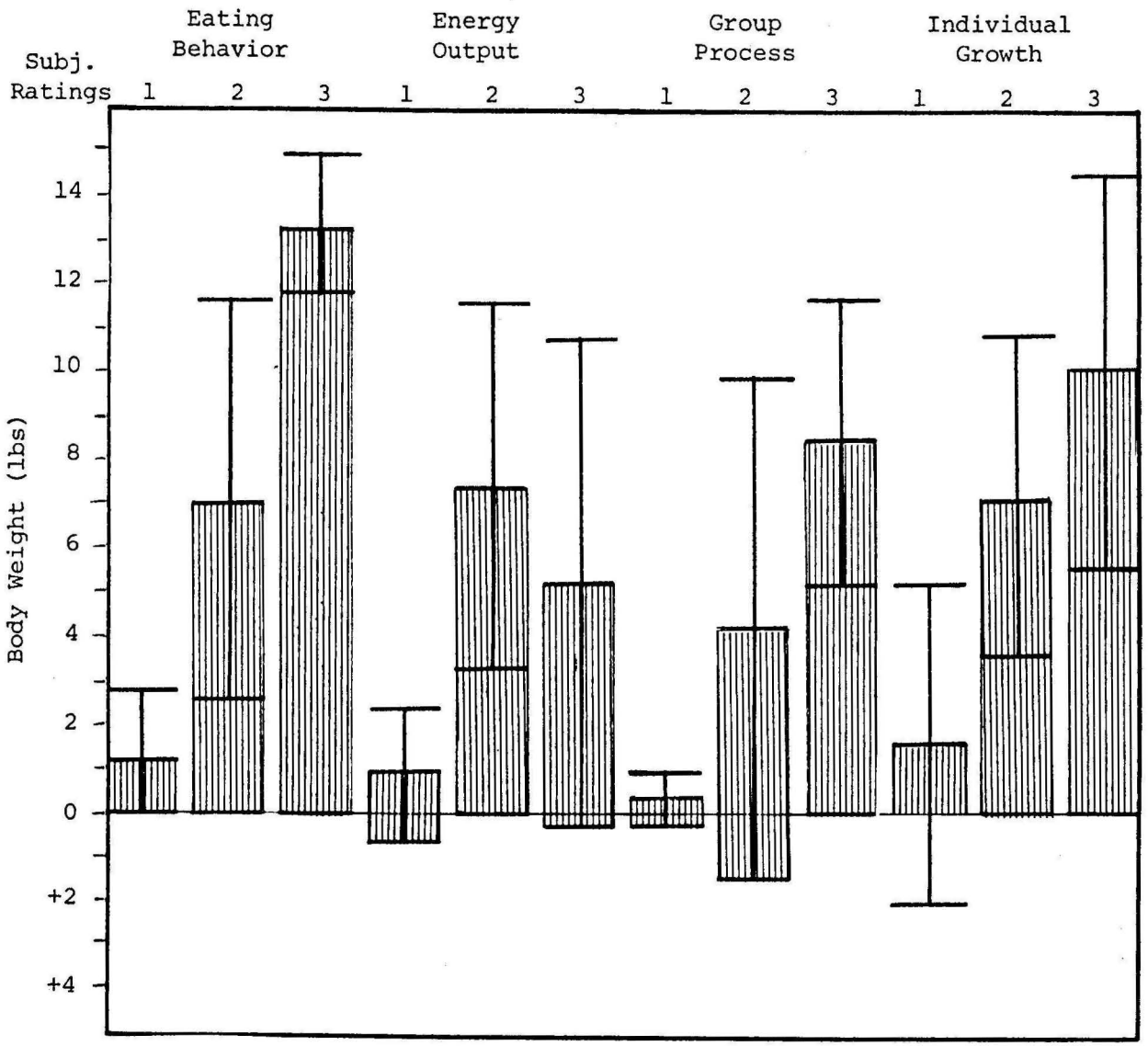

Figure 5.1

Relationship Between the Program Elements and the Mean Changes in Body Weight

experiencing personal success within the group context lost most body weight.

It might be expected that those subjects receiving a "three" rating on energy output[1] would also lose most body weight, more than either the "one" group or the "two" group. An examination of the second graph in Figure 5.1 shows this not to be true. The average loss of body weight for the "two" group exceeds that of group "three." This might be explained by: (1) the possible change in body composition--a decrease in subcutaneous fat and an increase in lean body mass, resulting in a lesser reduction of total body weight (4, 15); (2) the occurrence of interindividual differences in actual energy expenditure (4, 27) during the exercise sessions (limitations of the study did not allow for quantitative measurement of energy output); and/or (3) the offset of positive effects of exercise by poor dietary habits (27). Further examination of the average body weight loss of each energy output group does show that those subjects receiving a "one" rating (little or no participation in the exercise portion of the total program) decreased body weight the least, that being 0.64 percent as compared to 4.04 percent and 3.43 percent respectively.

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[1]"... attended over 75% of the exercise sessions, adhered to her personal exercise program, enrolled in other physical education classes, and/or reported increased activity outside of class."

The magnitude of the statistical relationship between reduction in triceps skinfold thickness and eating behavior was not as strong as that between body weight loss and eating behavior. This is not surprising, however, since the composition of weight change depends on whether or not physical exercise accompanies caloric restriction (8, 9, 28). Those subjects who were able to modify eating behavior either consistently or inconsistently did reduce triceps skinfold thickness by averages of 10.88 percent and 10.78 percent respectively. Those continuing with poor eating habits throughout the sixteen weeks reduced triceps skinfold thickness by 4.79 percent. (Again, the interrelationship between diet and exercise occurs--the two program elements have offsetting effects.) (Figure 5.2)

Comparisons among the three groups based on average millimeter decrement in triceps skinfold thickness reveals that the same directional trend exists between energy output and reduction of triceps skinfold thickness as did between energy output and reduction of body weight. In this case, however, there are only two plausible explanations: (1) the occurrence of interindividual differences in actual energy expenditure during the exercise sessions; and (2) the offset of positive effects of exercise by poor dietary habits. Intragroup variance within groups "two" and "three" account for the low H value; however, when these decrements are expressed as percentages (1.56 percent, 8.31 percent, and

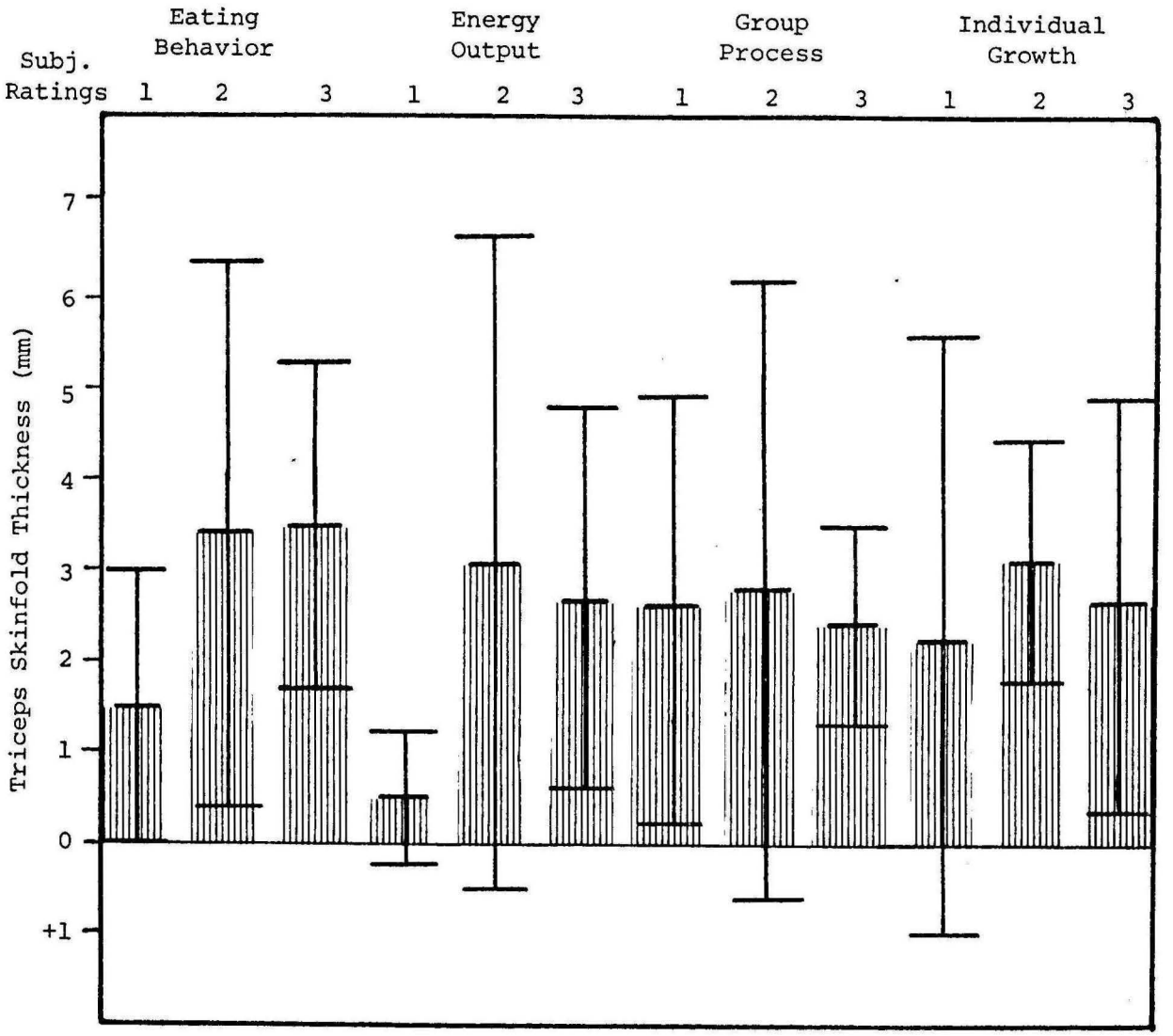

Figure 5.2

Relationship Between the Program Elements and the Mean Changes in Triceps Skinfold Thickness

9.51 percent respectively) the present findings are in accord with previous studies that indicate that increased physical exercise results in reduced skinfold thickness (4, 15, 41, 43, 61).

The relationship between individual growth and reduction in triceps skinfold thickness is an interesting one. The average decrements in triceps skinfold thickness for the three groups respectively were 7.45 percent, 10.35 percent, and 7.89 percent. This trend leads to the speculation that those subjects whose personal involvement in the individual counseling sessions was rated as "average" were still able to adhere to an exercise schedule and to either consistently or inconsistently modify eating behavior. Any psychological need for greater involvement in the individual counseling sessions was undoubtedly nonexistent. Group process did not appear to be related to change in triceps skinfold thickness.

Initial neuroticism-stability scores were shown to be significantly related to positive changes in body composition (Table 5.4). Figure 5.3 depicts the relationship of initial N-S score to the four specific program elements. The more "neurotic" subjects were unable to modify eating behavior ($P < 0.05$), thus lending support to the importance of overeating and obesity as adaptive measures to maintain equanimity. The more "neurotic" subjects also tended to be least successful in adhering to an exercise regimen ($P > 0.05$).

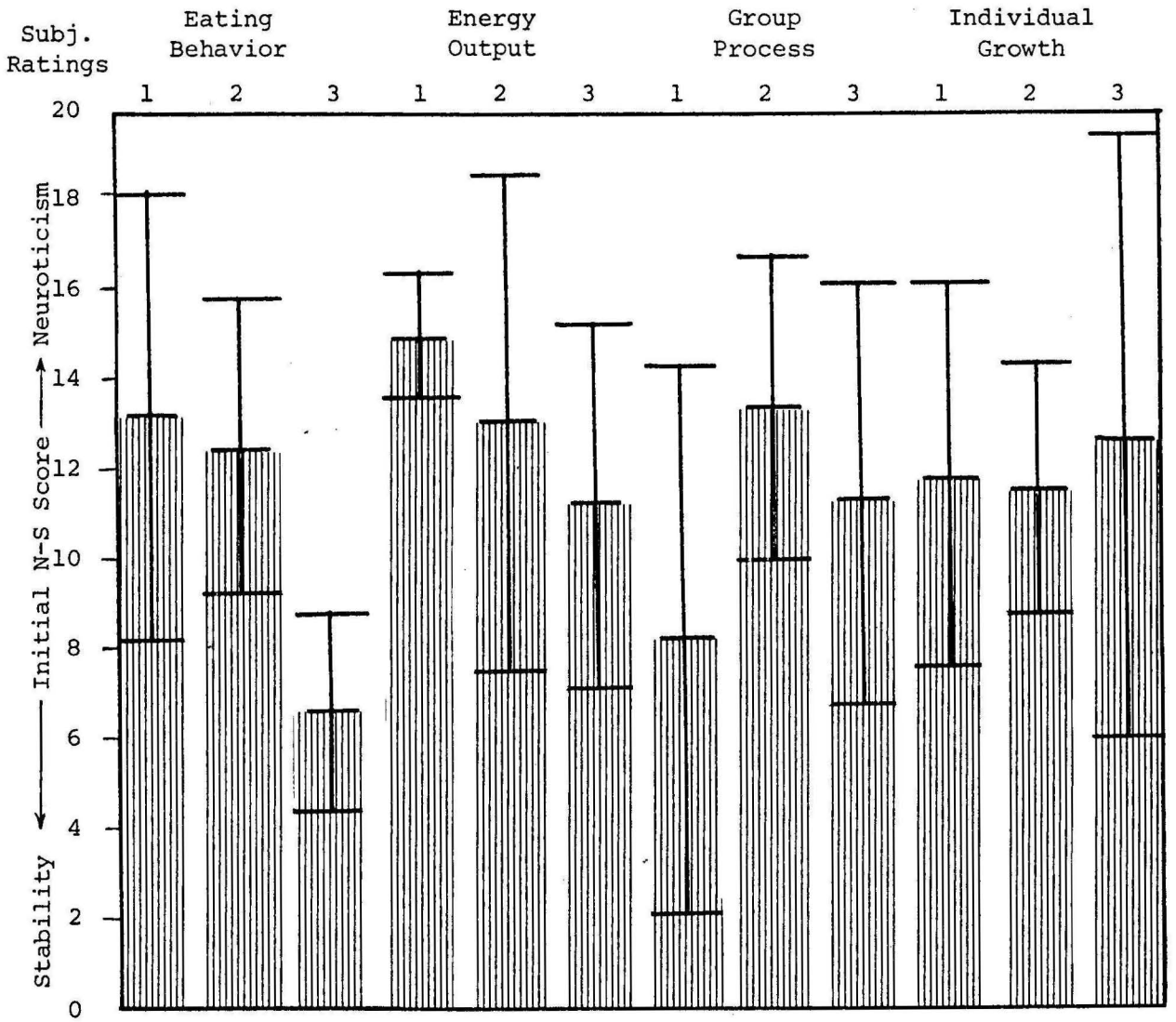

Figure 5.3

Relationship Between the Program Elements
and the Mean Initial N-S Score

Perhaps the H value for this relationship would have been greater had the structured exercise program been physically more demanding. Each subject was encouraged to work toward an individual maximum but this maximum was not objectively established (i.e. working at 60 percent maximum predicted heart rate for a given period of time); therefore, almost all of the subjects were able to experience success with the energy output portion of the program and receive a "three" rating, thereby minimizing any possible intergroup differences. (In group "one", N = 2; group "two", N = 7; group "three", N = 16.)

The H values for both psychological program elements (as related to initial N-S score) were not significant. Although, it may be of interest to note that the most "neurotic" (N-S = 12.83 $\pm$ 7.74) exhibited the greatest degree of personal involvement in the individual counseling sessions. In regards to group process, the most stable (N-S = 8.33 $\pm$ 6.11) tended not to participate; the most "neurotic" group (N-S = 13.50 $\pm$ 3.76) received a "two" rating, presumedly, these individuals were not yet psychologically "ready" for a fuller commitment to the group process.

Finally, Figure 5.4 graphically describes the relationship between the program elements and the mean differences between initial and post N-S scores. That is, since neuroticism was significantly reduced for the entire group of obese women (Table 5.1), is it possible to

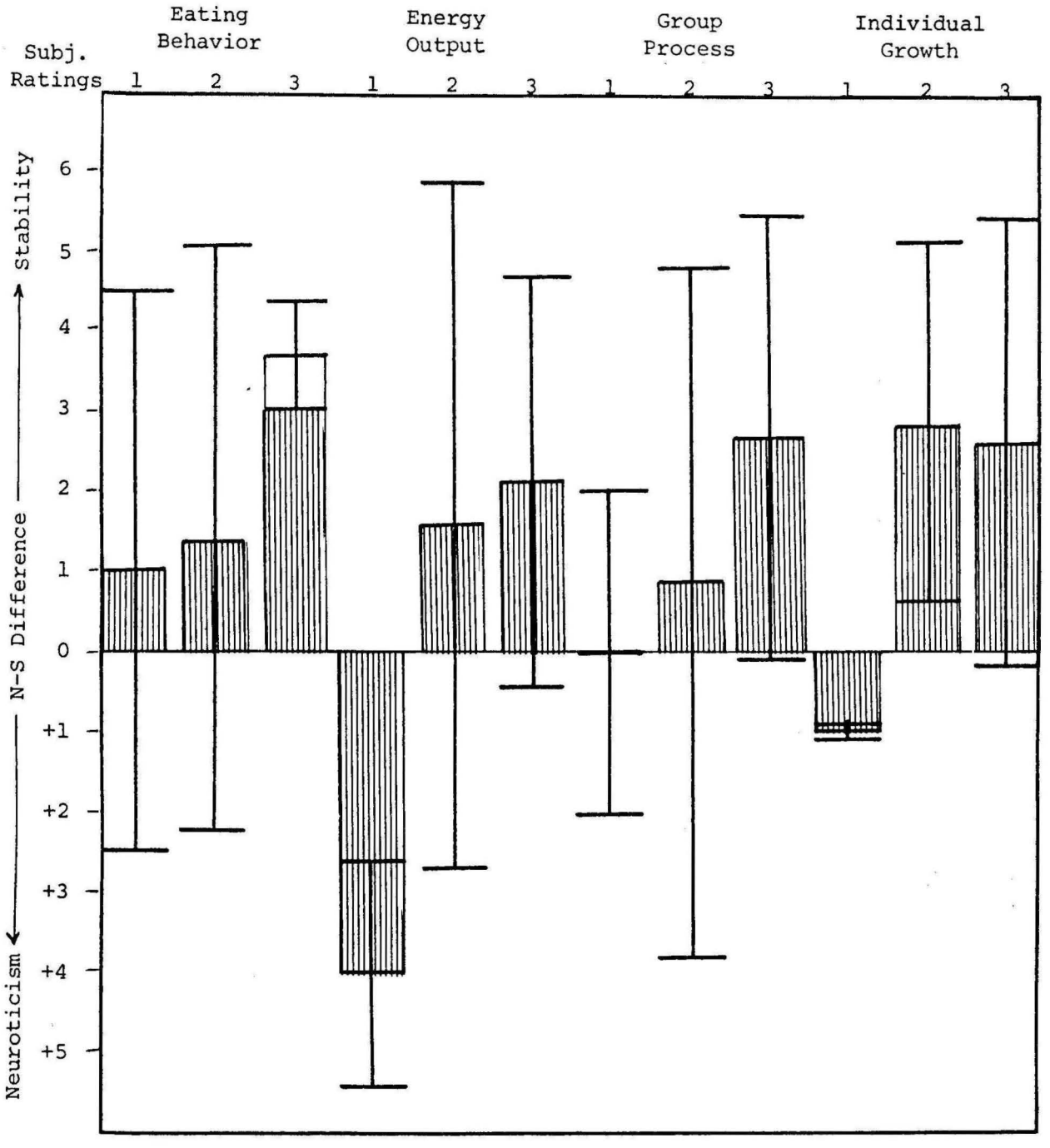

Figure 5.4

Relationship Between the Program Elements and the Mean Differences Between Pre and Post N-S Scores

distinguish which element(s) is most related to this reduction?

Although not significant at the 0.05 level, those subjects rated as "three" on energy output reduced the N-S score by an average of 19.46 percent; the "two" group by 11.94 percent; and the "one" group actually increased the N-S score by 26 percent. This trend suggests that the exercise portion of the total program not only has physiological benefits but psychological ones as well (17, 41, 15). Weight reduction can be achieved by: (1) increased energy expenditure and constant food intake, (2) decreased food intake and constant energy expenditure, and/or (3) a combination of these methods (16). In the present study a larger number of subjects were able to increase activity (sicteen) than to modify eating behavior (three). This is in accord with Bruch's theory (6) that it is easier for an obese patient to follow a prescribed routine, that is, to substitute the authority of another for personal free choice.

Three other general trends were noted: (1) those subjects who were able to consistently modify eating behavior showed the greatest decrement in neuroticism; (2) those subjects not experiencing personal success within the group context showed the least decrement in neuroticism; and (3) those subjects not exhibiting personal involvement in the individual counseling sessions showed an increase in neuroticism.

Once again, any discussion of neuroticism-stability change must incorporate the concept of deterioration effect. Table 5.7 summarizes data on the seven subjects who increased neuroses. It includes body composition changes, N-S change, Lie scale[2] change, and the subjective ratings in four program elements.

Table 5.7

Summary of Data on Subjects Experiencing Deterioration Effect

Subj.	Body Comp.		Psychol.		Program Elements			
	BW	TST	N-S	L	EB	EO	GP	IG
hk	0	0	+2	+1	1	3	1	1
md	- 9	- 4	+1	-1	2	3	3	2
pw	-12	-11	+6	0	2	2	2	1
ah	0	0	+5	0	1	1	2	1
jl	- 5	- 1.5	+2	-2	2	2	3	3
cw	- 2	- 1	+3	-1	1	1	2	1
jt	+ 2	0	+1	0	2	3	2	1

Out of the seven subjects who increased neuroses, five of them received subjective ratings of "one" on individual growth, but group process ratings were "two's" and "three's". It has been shown that obese subjects, because of certain personality characteristics, are able to respond positively to a group situation that is structured toward the dispersion and discussion of "safe" informational material rather than toward psychological change (45, 55).

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[2]Eighteen items used to identify those subjects showing "desirability response set" or "faking good".

The interrelationship of program elements is clearly demonstrated in the case of subject hk. Subject hk increased neurosis and increased the Lie score; however, she was not personally involved in either the group process or the individual counseling sessions. She greatly increased her energy output, yet measures of body composition remained unchanged. She made no attempt to modify her eating behavior.

Subjects md and jl both increased neuroses, but decreased the Lie scores. Powell (45) would explain this condition as a result of recognition of self-weaknesses. "Perhaps they felt secure enough not to 'fake' some of the items on the posttests which they had earlier marked in the pretests." Heslet (24) suggests the existence of two possible factors: "(1) the fact that the subject is being more honest after his close interpersonal relationship with the counselor, and (2) the fact that the subject can reveal himself and form a more accurate self perception." Both subjects were personally involved in the group process and the individual counseling sessions. They were able to inconsistently modify eating behavior and to increase energy output (subject md discernibly increased her physical activity and this was reflected in her larger decrement of triceps skinfold thickness).

Subjects ah, cw, and jt increased neuroses and showed no change in Lie scores. Body composition changes were not

significant. All three received a subjective rating of "one" in individual growth.

Finally, subject pw was able to achieve a significant positive change in body composition--a loss of 12 pounds in body weight and an 11 millimeter decrement in triceps skinfold thickness. A cursory examination of her progress would lead one to believe that she did not need to become involved in the individual counseling sessions. After all, she was able to inconsistently modify eating behavior, to increase energy output, to be somewhat successful within the group context, and, most important, she was losing weight. Only through the employment of psychological testing and interpretation (since she did not participate in the individual counseling sessions) was it possible to discover the adverse effect of this body composition change--a significant increase in neurosis.

Chapter 6

SUMMARY AND CONCLUSIONS

Summary

Weight loss follows the laws of thermodynamics--it is the result of a negative energy balance (16). Although this underlying theory is relatively simple, most weight reduction programs fail because of: (1) the subject's resistance to curtailing food intake (7); and/or (2) the subject's lack of motivation to exercise (8).

The purpose of this study was to investigate the relationship between personality (measured in terms of two primary, independent dimensions) and changes in body composition.

Twenty-five obese women voluntarily participated in a 16 week weight control program that consisted of four elements: eating behavior, energy output, group process, and individual growth. Pre and post physical measurements (body weight and triceps skinfold thickness) and pre and post psychological measurements (neuroticism-stability and extraversion-introversion) were made. Subjective ratings were made for each of the four program elements.

It was found that during the 16 week period, the group of obese women were able to decrease body weight, to reduce triceps skinfold thickness, and to increase stability

as measured by the EPI.[1] The initially more "stable" subjects effected greater changes in body composition than did the initially more "neurotic" subjects. Although not statistically significant ($p = 0.05$), there was a tendency for the initially more "neurotic" group to show a greater decrement in neuroses than the initially more "stable" group. Post N-S scores were not significantly related to changes in body composition, that is, as neuroticism was reduced, it became less influential as a factor in one's ability to effect positive changes in body composition. Extroversion-intraversion did not change during the 16 weeks, nor was this dimension of personality related to changes in body composition.

An attempt was then made to ascertain which of the program elements were influential factors in effecting physical and psychological changes. A summary of the interrelationship of program elements is presented below.

Body weight.[2] (1) Those subjects who were able to consistently modify eating behavior lost most body weight;

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[1]Although statistically significant, the actual physical changes which occurred were modest (a mean body weight loss of 5.52 ± 5.09 lbs. and a mean triceps skinfold thickness reduction of 2.64 ± 2.52 mm.). It should be remembered, however, that the Body Shoppe program is non-authoritarian in nature, designed to promote psychological integration and to develop self-discipline and self-direction as the primary routes to achieving weight reduction.

[2](1), (2), and (3) met the criterion for statistical significance, $p = 0.05$.

(2) those experiencing personal success within the group context lost most body weight; (3) those exhibiting the greatest degree of personal involvement in the individual counseling sessions lost most body weight; and (4) those NOT able to adhere to an excercise schedule lost the least amount of body weight.

Triceps skinfold thickness. (1) Those subjects NOT able to modify eating behavior showed the smallest decrement in triceps skinfold thickness; (2) those NOT able to adhere to an exercise schedule showed the smallest decrement in triceps skinfold thickness; (3) those rated "average" in degree of personal involvement in individual counseling sessions showed the greatest decrement in triceps skinfold thickness; and (4) group process did not seem to be related to change in triceps skinfold thickness.

Initial N-S score.[3] (1) The most "neurotic" subjects were NOT able to modify eating behavior; (2) the most "neurotic" were least successful in adhering to an exercise schedule; (3) the most "stable" subjects tended NOT to participate in group sessions; (4) the most "neurotic" exhibited the greatest degree of personal involvement in the individual counseling sessions.

Neuroticism-stability change. (1) Those subjects who were able to consistently modify eating behavior showed

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[3] (1) met the criterion for statistical significance, $p = 0.05$.

the greatest reduction in neuroticism; (2) those NOT able to adhere to an exercise schedule actually increased neuroticism; (3) those NOT experiencing personal success within the group context showed the least reduction in neuroticism; and (4) those NOT exhibiting personal involvement in the individual counseling sessions showed the least reduction in neuroticism.

Conclusions

In accord with the studies cited in Review of the Literature (14, 50, 57, 64, 65), among obese women it is possible to predict success with controlled dietary and exercise schedules by using an objective psychological test. There are, then, three alternatives: (1) to ignore psychological testing and to treat the symptom by prescribing a dietary/exercise regimen; (2) to eliminate the potentially unsuccessful individuals from any weight reduction program (it has been demonstrated that in spite of the physical handicaps, some obese persons should not attempt to reduce); or (3) to attempt to individualize treatment by employing individual counseling techniques concurrently with a dietary/exercise regimen.

In the present study, the more "neurotic" group lost significantly less body weight and showed a significantly smaller reduction in triceps skinfold thickness than did the more "stable" group. There was, however, a trend for the

more neurotic group to exhibit the greatest degree of personal involvement in the individual counseling sessions. The neurotic group also tended to show a greater decrement in neuroses (as measured by the N-S scale on the EPI) than the initially more stable group. These findings suggest that changes in body composition and personality do occur concomitantly; however, it is necessary to identify the relationship of a specific neurosis to an obesity and to begin abating this neurosis before lasting weight control can be achieved.

It is probably unwise to attempt weight reduction by dietary means alone (20, 62). Removing food from a delicately balanced individual may be emotionally harmful since overeating and obesity have been shown to be important adaptive measures to maintain equanimity. Since obese persons, however, are generally sedentary, a moderate exercise program will have definite physiological benefits. Also, it has been reported that such a program is conducive to a greater awareness of physical well-being and a more positive mental attitude.

Powell (45) concluded that there was little change in personality of overweight adolescent girls due to group counseling. Perhaps in a group situation it does take a longer period of time (her study was three or four months) to effect changes, or, as Suczek (55) suggested, many obese individuals are not motivated for psychiatric treatment and

respond more positively if the group is structured toward weight reduction information rather than toward psychological modifications.

While the group situation provides a supportive environment, relatively free of anxiety and other discomforts, in which to share and work out problems related to a common goal of weight reduction, it is the individual counseling sessions that are most important in reducing neuroses. Insight into the causes of one's obesity, however, will not necessarily result in behavior modification, nor is it possible to predict who will experience "deterioration effect." Each individual's progress must be continually evaluated and any ineffective techniques or negative influences should be immediately eliminated.

In the present study, it has been shown that the initially more "neurotic" subjects exhibited the greatest degree of personal involvement in the individual counseling sessions; also, those subjects experiencing "deterioration effect" did not participate in the individual counseling sessions. These facts further substantiate the role and importance of individual counseling in conjunction with the usual physical education approach to weight reduction. There are multiple causes of obesity and individual counseling affords opportunity to individualize treatment; the counselor has the available time and the professional interest to determine how the neurosis is related to obesity. Then, for

those individuals who are gradually able to become self-directing, and to modify eating behavior, lasting weight control will, in all likelihood, be achieved.

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