

Changes in Body Image and Other Psychological Factors After Intestinal Bypass Surgery for Massive Obesity

Gloria Rakita Leon,¹ Elka D. Eckert,²
Donald Teed,³ and Henry Buchwald⁴

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A group of massively obese persons (predominantly women) was evaluated 6 months prior to intestinal bypass surgery and again while in the hospital awaiting surgery. A second follow-up group of massively obese persons was evaluated on the same measures in-hospital prior to surgery and then assessed periodically over the subsequent 1-year period. The 6-months-before-surgery group showed a general decline in concern with physical symptoms, anxiety, and social introversion at the in-hospital evaluation. The surgery follow-up group exhibited an increasing improvement, as weight loss progressed, in body image, feelings of physical and sexual attractiveness, and evaluation of one's personality. An improvement in mood also was seen. Body size estimation showed a realistic adjustment with weight loss. Both groups scored higher than average on a measure of the addictive personality. Follow-up of the nonresponders indicated that a substantial proportion of those persons had psychological or severe physical problems subsequent to surgery.

KEY WORDS: bypass surgery; obesity; psychological changes.

¹ Department of Psychology, University of Minnesota, Minneapolis, Minnesota 55455.

² Department of Psychiatry, University of Minnesota Medical School, Minneapolis, Minnesota 55455.

³ University of Minnesota, Minneapolis, Minnesota 55455.

⁴ Department of Surgery, University of Minnesota Medical School, Minneapolis, Minnesota 55455.

INTRODUCTION

Surgical procedures for treating the massively obese (i.e., persons who are at least 100% above ideal body weight) have been used with increasing frequency since Payne *et al.* (1963), Lewis *et al.* (1966), and others reported on the development of various types of intestinal bypass techniques. Surgical treatment for the massively obese has generated a great deal of interest because generally there is a significant weight loss subsequent to surgery. Buchwald *et al.* (1973) reported a 35% average weight loss over time with jejunoileal bypass surgery. A 39% mean weight loss was reported by Mills and Stunkard (1976).

Many of the persons who have undergone bypass surgery experience a dramatic change in their physical appearance during a relatively short time period since the greatest amount of weight loss tends to occur in the first year after surgery (Buchwald *et al.*, 1973). This change to a more normal weight status may be of important psychological significance because the majority of these persons have been obese and therefore of deviant body state since childhood (Kalucy and Crisp, 1974; Solow *et al.*, 1974). Individuals who have experienced bypass surgery therefore provide the subject material for a natural experiment to study the effects of a significant and relatively sudden change in physical status on body image and other psychological variables.

Poor body image appears to be a significant factor in obesity. Previous research indicated that obese adolescents and adults evaluated their bodies in a negative manner and had poor self-esteem (Hammar *et al.*, 1972; Stunkard and Burt, 1967; Stunkard and Mendelson, 1967). Further, both obese and normal-weight adults (Cappon and Banks, 1968) and children (Leon *et al.*, 1978) tended to overestimate the size of their body dimensions when perceptual measures of body image were used. Glucksman and Hirsch (1969) found that six massively obese adult patients with juvenile onset obesity showed increasing overestimation of their body size during and after hospitalization for weight reduction, i.e., they perceived themselves as if they had not lost weight.

The initial reports evaluating persons who had undergone intestinal bypass surgery indicated an improvement in body image evaluation (Kalucy and Crisp, 1974; Solow *et al.*, 1974). However, Kalucy and Crisp reported that 50% of their subjects continued to feel as if they were still large, and Kalucy *et al.* (1975) found that 12 female patients, 2 years after bypass surgery, continued to overestimate their body size. An analysis of human figure drawings indicated a tendency for overestimation of body size before surgery and a tendency to underestimate residual obesity 1 year after surgery (Castelnuovo-Tedesco and Scheibel, 1976).

The emotional and other psychological concomitants of bypass surgery also have been inconsistent. Espmark (1975) reported that a significant number of persons experienced problems of anxiety and depression after surgery that included several suicide attempts during the year after the operation. However,

Brewer *et al.* (1974) and Crisp and Kalucy (1975) found an improvement in psychiatric symptoms and no evidence of symptom substitution after surgery. Further, Solow *et al.* (1974) reported that the persons in their sample who were categorized as psychologically impaired had, as a group, as good a psychiatric outcome as those considered well adjusted before surgery. Nonetheless, 21% of the persons in the Solow *et al.* study manifested psychiatric problems during the follow-up period ($N = 6$) and hospitalization was required for two of this group.

The purpose of the present study was to specifically evaluate body image both from a semantic or evaluative viewpoint and from a precisely measured perceptual aspect. Changes in mood, personality, and interpersonal functioning at varying periods prior to and after surgery also were studied. The specification of emotional and social functioning prior to surgery was considered crucial in evaluating the changes occurring after surgery.

METHOD

Subjects

The persons participating in this study were referred to or had come voluntarily to one of the investigators (H. B.) at the University of Minnesota Hospital requesting jejunoileal bypass surgery for massive obesity. The selection criteria for surgery were as follows: a history of being at least 100 lb overweight for a minimum period of 5 years and having been unsuccessful during that time in maintaining a weight loss although having tried dietary and other methods of weight reduction. The psychiatric criteria for exclusion from surgery were that the individual manifested gross psychopathology and/or did not possess the intellectual capacity and emotional stability to comply with the postsurgical dietary procedures and physical examination follow-ups. Moderate forms of emotional disorder were not considered a contraindication for surgery.

The potential bypass patient was screened by one of the investigators (E. E.) when questions about selection arose. However, there were no persons eliminated from surgery for psychiatric reasons over the course of this investigation. (Over a series of 850 patients seen at University Hospitals, only five were eliminated for psychiatric reasons.) All persons accepted for surgery over a 1-year period were included in this study. However, complete data could not be obtained on every person cooperating in the follow-up since some lived out of state or the country, making it necessary to mail the appropriate materials to them.

Group 1 consisted of 24 persons (20 females and four males) who were evaluated for the first time at least 6 months prior to surgery. The age of the females ranged from 18 to 60 years; the median age was 36.25 years. For the males, the age range was from 28 to 40 years; the median age was 28.75 years.

The median weight of the females was 251.80 lb (ranging from 220 to 377 lb). The median weight of the males was 338.50 lb (ranging from 322 to 355 lb). Juvenile onset of obesity was reported by 85.0% of the persons in this group. In-hospital information was obtained on 16 persons (14 females and two males).

Group 2 consisted of 48 individuals (42 females and six males) who were evaluated for the first time after admission to the hospital several days prior to surgery. The age range of the females was from 21 to 53 years; the median age was 33.0 years. For the males, the age range was from 24 to 35 years; the median age was 27.5 years. The median weight of the females was 267.0 lb (ranging from 220 to 375 lb). The median weight of the males was 366.0 lb (ranging from 275 to 440 lb). Juvenile onset of obesity was reported by 82.2% of the persons in this group.

Follow-up cooperation was obtained with 35 persons (31 females and four males). The mean 1-year weight loss was 93.83 lb (ranging from 50 to 190 lb).

The persons in both groups were white, of varying socioeconomic status.

Measures

A Semantic Differential with 16 bipolar scales was constructed for the concepts "My Body Right Now" and "My Personality Right Now." The majority of the adjectives were similar to those categorized under the evaluative factor by Osgood *et al.* (1957). Seven of the same adjective scales were used for both concepts.

The Self-Attitude Questionnaire (SAQ) is a self-administered 40-item multiple choice instrument specially designed for this investigation. The individual items were developed to obtain information about the individual's present attitude toward one's body, best and least liked body parts, and attitudes about one's physical and sexual attractiveness. Information also is elicited about various kinds of interpersonal activities and attitudes toward food and eating.

The Body Perception Test (BPT) is a device consisting of a black wooden screen on which two metal rods can be moved back and forth by the experimenter (Slade and Russell, 1973). The experimenter asks the subject to indicate the point at which the distance between the rods is equivalent to the dimensions of various body parts. The subjects are asked to give estimates for seven body dimensions: the length or width of the foot, face from temple to temple, chest from armpit to armpit, waist, hips at the widest point, arm length, and body depth (the greatest depth from front to back of the body below the waist). Two judgments are obtained for each body part. Following the entire series of size estimations, the actual size of these body parts is ascertained by measurement with a caliper. A distortion ratio (mean of perceived estimation/actual dimension \times 100) is calculated for each body part. A perceptual judg-

ment and distortion ratio also is obtained for a nonsymmetrical block of wood that is used as a control object.

The Minnesota Multiphasic Personality Inventory (MMPI) was administered in order to evaluate personality patterns and possible changes in these patterns over time. The MMPI-derived MacAndrew Scale (MAC) has been used as a measure of "addiction proneness" or the "addictive personality."

Procedure

Group 1

The persons in group 1 were evaluated at least 6 months prior to surgery. The testing took place after the persons had been accepted for intestinal bypass surgery. They had been placed on a waiting list of at least 6 months' duration because of the large number of persons undergoing this surgical procedure. The persons were tested several days after being placed on the waiting list and were administered the Semantic Differential, Self-Attitude Questionnaire, and MMPI, as well as a number of other eating pattern, physical symptoms, and medication measures that will be reported on in a separate article.

The second testing period for group 1 occurred several days prior to surgery when the individual already had been admitted to the hospital. The same series of tests was readministered. Because of the logistical arrangements necessary for administering the BPT, this measure was used only at the in-hospital evaluation.

Group 2

The persons in group 2 were evaluated for the first time after their admission to the hospital and several days prior to surgery. They were administered the Semantic Differential, Self-Attitude Questionnaire, Body Perception Test, and the MMPI. Follow-up evaluations were carried out 3 months, 6 months, and 1 year after surgery. The persons completed the Semantic Differential and SAQ at the 3 months follow-up, the Semantic Differential, SAQ, and BPT at the 6 months follow-up, and the Semantic Differential, SAQ, BPT, and MMPI at the 1 year follow-up.

RESULTS

The strategy of evaluating two groups of persons undergoing intestinal bypass surgery was to use the group 1 data 6 months prior to surgery as a baseline measure and as a comparison to the data obtained when the person

was hospitalized prior to surgery. Otherwise, the prospect of surgery and possible uncertainty about personal outcome could have been a confounding factor in interpreting the results obtained at the in-hospital time period.

A comparison of the data from group 1 and group 2 at the in-hospital period indicated few statistically significant differences on the Semantic Differential, SAQ, and BPT. There was only one significant difference between the groups on the Semantic Differential, two out of 40 items showed significant differences on the SAQ, and no significant differences were found on the BPT. The results therefore indicate that groups 1 and 2 responded in a quite comparable manner on these measures at the in-hospital period, and the few significant differences could have occurred by chance.

Group 1

Semantic Differential

Matched t tests were performed for each of the scale scores for the concept "My Body Right Now" and the concept "My Personality Right Now" comparing the ratings 6 months before surgery and the in-hospital time period.

Significant changes were found on the heavy-light scale for the concept "My Body Right Now" ($t = 2.28, p < 0.04$) and on the repulsive-attractive scale for the concept "My Personality Right Now" ($t = -2.19, p < 0.05$). The individuals rated their bodies as lighter and their personalities as more repulsive at the in-hospital evaluation.

Self-Attitude Questionnaire (SAQ)

The small number of males in the sample precluded a separate statistical analysis of the results. Since a large number of questions on the SAQ would be expected to show sex differences (e.g., ratings of masculinity and femininity), only the data for the females were formally analyzed. The responses to the SAQ items 6 months prior to surgery and in-hospital were compared by means of matched t tests. Only two of the items showed statistically significant differences over time: "How often do you eat more than you intended at mealtimes?" ($t = 2.39, p = 0.03$) and "How pleased are you with your present eating patterns or habits?" ($t = 3.66, p < 0.001$). There was an increase over time in the frequency with which persons ate more at mealtimes than they intended to, and a change over time to a more neutral attitude about present eating habits.

At both evaluations, the head was rated by the majority as the most liked body part (64.3% and 71.4%, respectively) and the waist as the least liked body part (42.9% and 57.1%, respectively).

MMPI

The scores on the MMPI-derived MacAndrew (MAC) and Overcontrolled Hostility (OH) scales were evaluated (Dahlstrom *et al.*, 1960) as well as the standard validity and clinical scales. Matched *t* tests were carried out comparing the *T* score means (non-*K*-corrected) for the females at the 6-months-prior and the in-hospital periods. *T* score means for the various scales were within normal limits for both time periods. A mean 0-2-3 (Si-D-Hy) profile was seen at both time periods. However, nine of the scales showed statistically significant mean changes over time. A significant *T* score decline occurred on scales 1 (Hs), 3 (Hy), 4 (Pd), 7 (Pt), 8 (Sc), and 0 (Si). A significant increase in *T* score was found on scales 5 (Mf), ES, and MAC. The group therefore manifested a significantly lesser degree of bodily concerns, impulsivity and interpersonal tensions, anxiety, social isolation, and introversion in-hospital as compared to the prior 6-month period. The in-hospital MAC score (26.00) was within the addictive range (MacAndrew, 1965).

Table I presents the MMPI *T* score means comparing the 6-months-prior and the in-hospital periods.

The *T* score means for the two males were within normal limits 6 months before surgery. Scale elevations were found on scales 1, 2, 3, and 7 for one

Table I. Group 1 MMPI *T* Score Means^a for Females 6 Months Prior to Surgery and In-Hospital

Scale	6 months prior	Hospital	<i>t</i>
L	50.87	48.80	-1.44
F	55.47	54.00	-0.92
K	52.33	51.67	-0.42
1 (Hs)	59.87	47.93	-4.52 ^{b,c}
2 (D)	61.47	59.13	-1.19
3 (Hy)	61.27	56.87	-2.55 ^d
4 (Pd)	60.33	47.67	-4.30 ^c
5 (Mf)	46.53	49.80	2.39 ^d
6 (Pa)	53.53	53.33	-0.08
7 (Pt)	52.47	43.13	-3.15 ^e
8 (Sc)	52.07	41.53	-4.71 ^c
9 (Ma)	51.87	50.13	-0.93
0 (Si)	63.53	60.80	-2.87 ^e
ES	50.73	53.73	2.16 ^d
MAC	20.50	26.00	2.86 ^e
OH	13.93	14.07	0.10

^aNon-*K*-corrected.

^bProbabilities are for a two-tailed test of significance.

^c*p* < 0.001.

^d*p* < 0.05.

^e*p* < 0.01.

person in-hospital, although the *T* scores were still within normal limits. The other male showed substantial increases in-hospital on scales 1, 2, 3, 7, 8, and 9 (Ma); scales 1 and 2 were in the pathological range.

Group 2

Semantic Differential

ANOVAs for repeated measures were performed on the body and personality judgments in-hospital, and at the 3 months, 6 months, and 1 year follow-up periods. All but three of the judgments for "My Body Right Now" showed highly significant differences over time ($p < 0.001$). Statistically significant linear trend components (Kirk, 1968) also were demonstrated on the judgments showing significant time changes. The ratings that changed over time all shifted in the direction of a more favorable body image. The three nonsignificant scale dimensions were dirty-clean, soft-hard, and weak-powerful.

Table II presents the analysis of the scale means for the concept "My Body Right Now" at the various time periods.

The ratings for the concept "My Personality Right Now" exhibited significant changes over time on nine of the 16 scales. In all cases, the change was in the positive direction. The scales showing significant changes were repulsive—

Table II. Mean Semantic Differential Ratings for the Concept "My Body Right Now" for Group 2 at the In-Hospital, 3 Months, 6 Months, and 1 Year Follow-up Periods^a

Body judgment	Scale means				ANOVA
	Hospital	3 months	6 months	1 year	<i>F</i>
Fat—thin	1.70	2.58	3.49	4.21	30.249 ^b
Ugly—beautiful	2.82	3.24	3.70	4.33	16.239 ^b
Undesirable—desirable	2.79	3.39	3.76	4.49	18.498 ^b
Dirty—clean	6.06	6.33	5.79	6.21	1.910
Soft—hard	2.42	2.58	2.58	2.52	0.176
Unproportioned—proportioned	2.46	3.24	3.91	4.30	19.948 ^b
Heavy—light	1.64	2.49	3.27	4.03	41.238 ^b
Weak—powerful	4.06	3.88	4.15	4.18	0.515
Unpleasant—pleasant	3.42	4.21	4.21	5.18	11.486 ^b
Massive—fragile	2.64	3.18	3.36	3.91	10.362 ^b
Repulsive—attractive	2.97	3.85	4.03	4.79	20.012 ^b
Large—small	1.82	2.55	3.24	3.73	22.216 ^b
Inactive—active	3.39	4.33	4.64	5.12	14.944 ^b
Flabby—firm	2.46	3.18	3.39	3.55	7.277 ^b
Bad—good	3.30	3.97	4.36	5.09	13.656 ^b
Uncomfortable—comfortable	2.52	4.09	4.42	5.18	35.766 ^b

^a1, Negative direction; 7, positive direction.

^b $p < 0.001$.

Table III. Mean Semantic Differential Ratings for the Concept "My Personality Right Now" for Group 2 at the In-Hospital, 2 Months, 6 Months, and 1 Year Follow-up Periods^a

Personality judgment	Scale means				ANOVA
	Hospital	3 months	6 months	1 year	F
Ugly–beautiful	4.58	4.73	4.64	5.00	1.206
Unpleasant–pleasant	5.36	5.24	4.91	5.36	1.658
Undesirable–desirable	4.46	4.91	4.70	5.09	2.537
Repulsive–attractive	4.64	4.88	5.06	5.33	3.145 ^b
Shy–outgoing	4.24	4.67	4.70	5.18	5.086 ^c
Self-concerned–self-assured	3.27	4.15	4.24	4.91	16.057 ^d
(Weight preoccupation)	2.82	3.79	4.09	4.52	10.767 ^d
Unpopular–popular	4.58	5.00	4.64	5.12	3.085 ^b
Hateful–lovable	4.88	4.94	4.82	5.18	1.026
Slow–quick	4.27	4.70	4.82	5.12	4.156 ^c
Thick skinned–sensitive	3.03	3.18	3.12	3.46	0.803
Weak–powerful	4.06	4.67	4.18	4.58	3.676 ^c
Inactive–active	4.15	4.97	4.79	5.36	7.950 ^d
Worthless–worthwhile	5.21	5.21	5.24	5.27	0.027
Uncomfortable–comfortable	4.24	5.09	5.09	5.33	3.114 ^b
Bad–good	5.27	5.33	5.21	5.61	1.373

^a 1, Negative direction; 7, positive direction.

^b $p < 0.05$.

^c $p < 0.01$.

^d $p < 0.001$.

attractive, shy–outgoing, self-conscious–self-assured, preoccupied with weight–not preoccupied with weight, unpopular–popular, slow–quick, weak–powerful, inactive–active, and uncomfortable–comfortable. Seven of these nine scales had statistically significant linear trend components. The exceptions were unpopular–popular and weak–powerful. The last two scales showed relatively more favorable ratings at 3 months and 1 year, while the in-hospital and 6-month ratings were not significantly different from each other.

Table III presents the analysis of the scale means for the concept "My Personality Right Now" at the in-hospital, 3 months, 6 months, and 1 year time periods.

Over time, the persons rated their personalities as more attractive, outgoing, self-assured, quick, active, comfortable, popular, and powerful, and less preoccupied with weight.

Self-Attitude Questionnaire

The SAQ multiple choice items for the females were evaluated over time by an ANOVA for repeated measures. Twenty of the 40 items showed a significant time change, all in a more favorable direction. A statistically significant linear trend component was demonstrated for 19 of these 20 items.

Table IV presents the SAQ items that showed statistically significant changes at the follow-up points.

The women in the study rated themselves as more physically attractive, thinner, more feminine (physically), more sexually attractive, more in control of and pleased with their eating patterns, and more sociable. There was no significant change reported in sexual activity or sexual pleasure, expected happiness in life, or satisfaction with social and work life. At both the in-hospital and 1 year follow-up periods, the head was rated by the majority as the most liked body part (65.7% and 68.6%, respectively). The waist and hips were each rated as the least liked body part by 31.4% of the women in-hospital. At the 1 year follow-up, 37.1% rated the waist and 20.0% rated the hips as the least liked body part.

Three additional items relating to expectations about bypass surgery were administered after surgery. In reference to body state, 54.3% of the females at the 3-month interval, 65.7% at the 6-month interval, and 60.0% at the 1 year

Table IV. SAQ Items Showing Statistically Significant Changes Over Time for Females^a

Question	Scale means				ANOVA <i>F</i>
	Hospital	3 months	6 months	1 year	
1. Physical attractiveness (face)	2.55	2.36	2.23	2.26	4.784 ^b
2. Physical attractiveness (body)	4.55	3.84	3.58	2.77	39.542 ^c
3. Physical attractiveness, men consider my face	2.81	2.55	2.42	2.32	6.239 ^c
4. Physical attractiveness, men consider my body	4.42	3.90	3.65	3.00	23.072 ^c
6. Physical attractiveness, women consider my body	4.45	3.87	3.74	2.94	32.044 ^c
7. View self (very fat—very thin)	1.13	1.48	1.81	2.19	38.207 ^c
8. Others view me (very fat—very thin)	1.16	1.48	1.77	2.19	19.991 ^c
12. How “feminine” rate your body?	2.19	1.90	1.97	1.81	3.976 ^b
17. How heavy rate self?	1.10	1.36	1.48	1.97	17.868 ^c
18. How powerful at present body state?	3.07	2.90	2.74	2.55	3.982 ^b
19. How pleased at present body weight?	4.94	3.32	3.07	2.26	50.903 ^c
22. Self-rating of sexual attractiveness	3.71	3.19	3.07	2.42	18.357 ^c
23. Rating of sexual attractiveness by members of opposite sex	3.86	3.55	3.26	2.61	16.196 ^c
29. Enjoyment at eating food	1.48	1.97	2.00	1.58	5.050 ^{d,e}
30. How much look forward to mealtimes	1.55	2.03	2.13	1.90	8.571 ^c
33. Feeling of fullness at end of meal	1.94	2.16	2.52	2.32	3.791 ^b
34. How often eat more than intended at mealtimes	1.61	2.87	2.87	2.58	24.883 ^c
35. How often eat more than intended between meals	2.07	3.03	2.90	2.77	9.729 ^c
36. How pleased with present eating habits	4.19	2.65	2.74	2.65	25.496 ^c
37. Rate self (from less sociable to more sociable than average)	1.84	1.94	2.03	2.13	3.214 ^d

^a1, Positive direction; 5, Negative direction except for No. 37.

^b*p* < 0.01.

^c*p* < 0.001.

^d*p* < 0.05.

^eLinear trend not significant.

follow-up indicated that their expectations about changes in body state had been fulfilled. The responses to the item "Were your expectations about changes in your life fulfilled?" demonstrated a "yes" response by 31.4% at the 3-month interval, 42.9% at the 6-month interval, and 74.3% at the 1 year follow-up. Cochran's Q test indicated a statistically significant change over time ($p < 0.001$). The item "What is your spouse's attitude [or those closest to you] about your having undergone the bypass operation?" showed the following distribution: "very approving" was indicated by 65.7% at 3 months, 71.4% at 6 months, and 74.3% at 1 year. The change over time was statistically significant ($p < 0.001$). Therefore, expectations about changes in body state tended to be fulfilled relatively earlier than expectations for life changes. However, at the 1 year follow-up, a relatively greater proportion reported that life change expectations in comparison to body change expectations had been fulfilled.

Four males completed the SAQ in-hospital and at the follow-up points. One showed no change on the SAQ over the 1-year period, although he lost 80 lb during that time interval. The other three males indicated that they were moderately or very pleased with their present body weight and reported that their expectations about changes in their body state and their life had been fulfilled. Two of the males also indicated a positive change in their view of their bodies and how women viewed their bodies. Their estimations of the degree that women considered them sexually attractive also showed a positive change.

Body Perception Test (BPT)

ANOVA for repeated measures was carried out comparing the estimations for the various body parts at the in-hospital, 6 months, and 1 year follow-up periods. The results indicated no significant differences over time in the accuracy of the estimations of the body dimensions and the control object. At all three time periods, there was a tendency to overestimate to a relatively similar degree all of the body dimensions except for the foot and arm. The latter two dimensions were consistently underestimated.

MMPI

Matched t tests were performed comparing the scores obtained for the females on the MMPI at the in-hospital and the 1 year follow-up periods. The mean scores for all of the scales were within the normal range. The mean profile at the in-hospital period was a 6-3-2 (Pa-Hy-D) configuration, and the 1 year follow-up a 6-3-9 (Pa-Hy-Ma) pattern. Significant scale reductions were found 1 year after surgery on scales 2 (D) and 0 (Si), and a significant increase occurred on ES. The mean score on scale 2 was 57.42 in-hospital and 52.61 at the 1 year follow-up. For scale 0, the mean score was 54.82 in-hospital and 50.58 at

Table V. Group 2 MMPI *T* Score Means^a for Females Comparing In-Hospital with 1 Year Follow-up

Scale	Hospital	1 year follow-up	<i>t</i> ^b
L	47.94	47.94	0.01
F	52.18	54.03	1.78
K	55.52	56.58	0.99
1 (Hs)	44.06	45.73	0.76
2 (D)	57.42	52.61	-2.55 ^c
3 (Hy)	58.27	56.18	-1.65
4 (Pd)	50.88	54.09	1.86
5 (Mf)	41.97	43.48	0.84
6 (Pa)	59.09	56.24	-1.49
7 (Pt)	41.67	41.82	0.06
8 (Sc)	42.39	44.97	1.19
9 (Ma)	51.48	53.79	1.10
0 (Si)	54.82	50.58	-2.68 ^d
ES	54.88	57.64	2.12 ^c
MAC	23.58	23.87	0.26
OH	13.16	13.23	0.09

^aNon-*K*-corrected.

^bProbabilities are for a two-tailed test of significance.

^c $p < 0.05$.

^d $p < 0.01$.

the 1 year follow-up; the ES scale scores were 54.88 and 57.64 for the same time periods. These results therefore indicate an improvement in mood, ego strength, and activity level, and a decline in social isolation 1 year after surgery.

Table V presents the MMPI *T* score means comparing the in-hospital with the 1 year follow-up period.

The mean profiles for the four males who completed the MMPI at the two time periods were a 5-3-9 (Mf-Hy-Ma) configuration in-hospital and a 5-9-2 (Mf-Ma-D) at the 1 year follow-up. All of the *T* score means were within the normal range.

The MAC scores in-hospital and at the 1 year follow-up were quite consistent (23.58 and 23.87, respectively) and are just under the addiction cutoff score of 24. The individual MAC scores for the females were compared with their responses to an eating pattern questionnaire administered at the 1 year follow-up. The mean in-hospital MAC score of those who at the follow-up indicated that they were eating more than before surgery was 26.0. Those who reported eating the same amount as before surgery had a mean in-hospital MAC score of 25.08. The mean in-hospital MAC score of those eating less than before surgery was 21.92. The difference in MAC score between those who were eating the same or more and those who were eating less showed a trend toward statistical significance ($p = 0.08$). Comparison of the 1 year follow-up MAC score and reported

eating patterns yielded similar results. The 1 year follow-up mean MAC score was 26.0 for those eating more at the 1 year follow-up, 25.16 for those eating the same amount, and 22.33 for those eating less ($p = 0.07$). For the group as a whole, the quantity of daily food intake at the follow-up period in comparison to the quantity consumed before the operation was judged as "greater" by 10% of the persons, "the same" by 40%, and "less" by 47.5%.

The mean MAC score for the males was 25.5 in-hospital and 26.5 at the 1 year follow-up.

Other Habit Problems

There were no reports of the development of other habit problems such as alcoholism or drug abuse over the course of the follow-up period.

Nonresponder Information

The 13 persons in group 2 who did not return the follow-up materials were contacted by phone several times at each evaluation period. They generally indicated that they did not want to be bothered with filling out the questionnaire materials. However, they did give verbal reports of their progress and their medical charts were reviewed retrospectively. Five of these persons reported that they were pleased with their weight loss and felt much happier after the operation. Four persons reported that they were having extremely severe physical problems subsequent to surgery, and two of this group indicated severe psychological problems as well. The medical problems ranged from kidney stones, severe nausea, and vomiting, to jaundice. One of these patients eventually died of multiple organ failure after a gradually downhill course. Four other persons reported severe psychological or family problems ranging from anxiety, insomnia, and depression, to interpersonal and family problems because of engaging in sexual relationships with a number of partners. Thus the inclusion of the non-responder group indicates that 12.5% of the total sample ($N = 6$) reported severe psychological problems, and 16.6% of the total sample ($N = 8$) reported either severe psychological or physical difficulties or a combination of these problems subsequent to bypass surgery.

DISCUSSION

The results of this study indicate that for this particular group of massively obese persons, i.e., those with a range of psychological problems prior to surgery but without gross psychopathology, jejunioileal bypass surgery had markedly beneficial psychological effects for the majority. The information on body image

obtained from a variety of measures demonstrated a clear change to an increasingly more favorable evaluation of one's body and one's personality as weight loss progressed. The women in the study rated both their face and their bodies over the 1-year period as increasingly more physically attractive to themselves and to other persons. They rated themselves as more feminine and sexually attractive and judged that others viewed them in this manner. However, there were no significant changes reported with weight loss in frequency of sexual activity or in sexual pleasure. A marked change occurred in how pleased the individuals were at their present body state, changing from an attitude of being markedly displeased in-hospital to one of being moderately pleased at the 1-year follow-up.

Personality ratings showed a shift in the direction of viewing oneself as more outgoing, self-assured, comfortable, and less preoccupied with weight. The group indicated that their expectations about their body state were fulfilled relatively earlier than their expectations about changes in their life. There also was an increase with weight loss in self-reports of feelings of power at their present body state. The persons also indicated that they were more sociable, more pleased with their present eating habits, and less likely to eat more than they intended to at meal times and between meals.

The MMPI findings in the present study further substantiated a significant reduction in dysphoric mood, an increase in activity level, and a decline in social introversion with weight loss. A comparison of the MMPI results of the persons tested 6 months prior to surgery and again in the hospital awaiting surgery demonstrates significant changes on a relatively large number of scales, although the profile for the group as a whole remained the same. A decline was evident in physical concerns, anxiety, interpersonal frictions, social isolation, and withdrawal when the persons were already in the hospital and involved in the process of preparing for the surgery that was to take place in the next few days. These findings suggest that these massively obese individuals were facing surgery with a positive mood and attitude about the changes that would occur after the operation. However, changes in attitude about one's body and personality were not evident during the presurgical waiting period or in the hospital prior to surgery. These changes were clearly demonstrated in the follow-up period, though, as weight loss progressed subsequent to surgery.

The perceptual factors of body image showed a realistic adjustment with weight loss as reflected by the size estimations on the BPT. There was a general tendency to overestimate the size of body parts, except for the foot and arm, that was consistent for each time period. However, the increasing overestimation of body size relative to actual size with weight reduction as reported by Glucksman and Hirsch (1969) was not seen in the present study. The relatively greater number of persons in the present investigation were able to adjust their perceptions of their actual body size, even though their body dimensions generally were changing quite rapidly over the 1 year follow-up period.

A great deal has been written about the psychological characteristics of obese persons and the presumed personality characteristics underlying or determining the obese state (Leon and Roth, 1977). However, the present investigation suggests that many of the symptoms such as anxiety, depression, poor body image, and low self-esteem reported to characterize obese persons may be a result of rather than the cause of their obese condition. The majority of persons in this study clearly showed an increasingly more positive change in body image and personality evaluation as they made progress in weight loss. This realistic change in evaluation of body state also was found by Leon (1975) in a group of moderately obese persons who lost weight over a 6-month period.

The concept of obesity as a habit disturbance rather than a problem of underlying psychopathology (Leon and Chamberlain, 1973) receives some support from the findings for group 2 on the MacAndrew (MAC) "addiction" scale. The mean score on this scale remained stable for group 2 from the in-hospital to the 1 year follow-up period and was just below the cutoff point for persons with known chemical substance addictions (MacAndrew, 1965). The absence of indications of marked psychopathology on the MMPI also suggests that the massive obesity problem manifested by the persons in this investigation is not due to severe underlying psychological disturbance.

The inconsistency in mean MAC score in group 1 cannot be readily explained. The relative elevation in score prior to surgery for this group possibly reflects a risk-taking attitude that may be an element of this scale. This attitude may be consistent with the voluntary risk inherent in undergoing surgery and the uncertainty of the specific outcome for that particular individual.

A note of caution is in order in terms of the implications of this study. It seems reasonably clear that there was an enhancement of psychological functioning after bypass surgery for the majority of massively obese persons without prior serious psychiatric problems. However, this procedure requires major surgery and the reported mortality rate for jejunoileal bypass surgery ranges between 1% and 6% (Leon, 1976). Liver damage is a serious complication, although there is evidence that fatty infiltration of the liver is present prior to surgery and that these liver changes are reversible over time (Buchwald *et al.*, 1974). Diarrhea, flatulence, rectal pain, and hair loss are some of the commonly reported side effects of bypass surgery. The positive psychological effects therefore must be judged within the context of the potentially negative physical effects. Further, it should be noted that a sizable proportion of persons who did not cooperate in returning the follow-up materials indicated that they were experiencing marked psychological problems, physical difficulties, or a combination of the two. (That these negative reports come almost exclusively from the nonresponder group points to the necessity of making every effort to contact as many persons as possible from the original group.) Thus it would seem appropriate to counsel massively obese persons who are contemplating bypass surgery to try all other means first except those diets and programs

that might endanger their health. However, for those obese persons who have tried other methods and failed and in whom massive obesity is a danger to their health, intestinal bypass surgery and the possibility of associated psychological benefits may be a viable alternative if carried out under follow-up supervision.

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