

## Psychopathological predictors of compliance and outcome in weight-loss obesity treatment

Chiara De Panfilis<sup>1</sup>, Sara Cero<sup>1</sup>, Elisabetta Dall'Aglio<sup>2</sup>, Paola Salvatore<sup>1</sup>, Mariateresa Torre<sup>1</sup>, Carlo Maggini<sup>1</sup>

<sup>1</sup>Unit of Psychiatry, Department of Neurosciences, Parma University Hospital, Parma, Italy; <sup>2</sup>Unit of Diabetology and Dis-metabolic Diseases, Department of Internal Medicine and Biomedical Sciences, Parma University Hospital, Parma, Italy

**Abstract.** *Background:* To detect pre-treatment psychopathological predictors of compliance and outcome in a behavioural weight-loss program for obesity. *Methods:* 68 consecutive obese outpatients were evaluated on a wide range of psychopathological variables before entering a behavioural weight reduction program. Base-line assessment included detection of psychiatric (Axis I) and personality (Axis II) disorders, anxiety and depression levels, temperament and character patterns, alexithymia, and eating attitudes. These variables were then tested as predictors of compliance and weight loss after eight months of active treatment. *Results:* Base-line presence of Axis I diagnoses was found to enhance the likelihood of good compliance to treatment but to lower probability of good outcome. Different psychopathological (and specifically personality) predictors of outcome were found among patients with and without psychiatric disorders. *Conclusions:* These data suggest the need to perform a full psychiatric evaluation, including personality assessment, to implement obesity treatment strategies. ([www.actabiomedica.it](http://www.actabiomedica.it))

**Key words:** Obesity, obesity behavioural treatment, psychopathology, risk factors, compliance, outcome, Axis I disorders, alexithymia, binge eating disorder, personality style

### Introduction

Because of the established relationship of obesity with serious medical illnesses, excessive mortality, and low psychosocial functioning, treatment issues in obesity are major focuses of concern to both physical and mental health practitioners. To date, behavioural programs to improve diet and eating habits, increase physical activity, and change lifestyle are the cornerstone of any obesity treatment, while pharmacotherapy and surgical procedures are still regarded as adjuncts or second-line treatments (1-6). However, the limited attendance to and efficacy of behavioural weight reduction treatments is well known among healthcare professionals (6, 7). Thus, identifying what factors account for poor compliance and outcome in

behavioural weight control programs is a major topic of research (7).

Unfortunately, predictors of treatment compliance and weight loss, including psychopathological predictors, have widely proven elusive. Personality traits, measures of psychopathology, dietary restraint, and history of weight cycling have all proven unreliable (7, 8). Even previous evidence indicating that binge eating disorder (BED) (9) could be considered a negative prognostic indicator in obesity (10-14) has been questioned in recent years (15-18).

Nevertheless, as some researchers (19) suggest, it could be premature to conclude that psychopathology is not related to weight-loss therapy outcome, and it could preclude inquiry into an area of great importance in treating obesity. Rather, a possible explanation

for this lack of reliable findings could be that obesity is strikingly heterogeneous (20) with respect to associated psychopathology and response to various treatments. So far, clinical attention should turn from whether psychopathological variables are related to outcome in weight loss programs, to which psychopathological factors affect which subgroup of patients and in what ways (19-21).

Thus, the potential hypothesis is that different subgroups of obese patients do exist, with different psychopathological patterns which contribute to different compliance and outcome in weight-loss treatments. In accordance with these considerations, this study was performed in order to identify psychopathological predictors of compliance and outcome in an eight-month behavioural weight-loss treatment, by assessing a wide range of pre-treatment clinical and personality variables (Axis I and Axis II disorders, depression and anxiety symptoms, eating attitudes and symptomatology, dimensional personality traits, temperament and character patterns and alexithymia).

Specifically, the aim of the study is to explore whether 1) pre-treatment psychopathological variables can allow for an identification of obese patients at risk of poor compliance and/or poor outcome; and, if so, whether 2) obese subgroups presenting with psychopathological risk factors for poor compliance and/or outcome further show different psychopathological or psychological correlates of compliance and weight loss compared with subjects not at risk.

## Methods

### *Participants and study design*

Sixty-eight obese outpatients (body mass index –BMI–  $\geq 30$ ) consecutively seeking for hospital-affiliated standard weight-reduction treatment at the Obesity Study Center, Parma University Hospital (Parma, Italy) from January 15<sup>th</sup>, 2001 to April 17<sup>th</sup>, 2001 were enrolled in the study, after having given written informed consent. Out of them, 88.2% were female and 11.8% male (mean age  $38.9 \pm 12.8$  years, and BMI  $36.1 \pm 6.9$ ).

The weight loss program consisted in a complete baseline medical evaluation (including physical examination, ECG, and laboratory tests) to assess obesity degree and associated diseases risk, inquiry into eating habits, with subsequent prescription of a personalized, hypocaloric diet and a daily program of light-to-moderate physical exercise. Nutritional counselling to adjust diet, behavioural counselling (i.e. emphasis on self-monitoring, stress and contingency management, problem solving and social support), and medical care were provided every 3 weeks during the whole eight-month follow-up period.

Significant improvement from baseline (T0) to endpoint (T1) (that is, significant response rate) was defined as a weight loss  $\geq 10\%$  of initial body weight (2, 6).

Exclusion criteria for study admission were the presence of severe and unstable physical diseases (e.g. diabetes mellitus, thyroid illnesses, heart and circulatory diseases) and pregnancy. None of the patients were being treated with psychoactive drugs at the evaluation times.

At baseline, a complete psychiatric evaluation was performed. All obese patients were interviewed using the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I/P) (22) and the Structural Clinical Interview for Personality Disorders (SIDP-IV) (23), in order to compute current Axis I and II diagnoses rates in the whole sample, according to the criteria of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (9). BED diagnosis was confirmed by administering a structured interview to assess the DSM-IV criteria for BED according to the model suggested by Spitzer et al (10). Depression and anxiety symptoms were assessed using the Hamilton Rating Scale for Depression (Ham-D) (24, 25), and the Hamilton Rating Scale for Anxiety (Ham-A) (26). Psychopathological attitudes about eating and related psychological variables were assessed using the Eating Disorders Inventory (EDI-2) (27). The Temperament and Character Inventory (TCI) (28) and the twenty-item Toronto Alexithymia Scale (TAS-20) (29, 30) were administered in order to investigate temperament and character patterns and to detect the presence of alexithymia.

### *Procedure and statistical analysis*

Drop-out rates and percentage of responders after 8 months of weight loss treatment were calculated.

To address the first study question (that is, if patients with good compliance or outcome could be distinguished from those with poor compliance or outcome by means of specific pre-treatment psychopathological variables) we used the following procedures:

- differences in sex distribution, Axis I and Axis II disorders rates, and in the means of age, BMI, SIDP-IV, TCI, TAS, EDI-2, Ham-D, Ham-A scores at T0 were evaluated in subjects who completed the follow-up and those who did not, and in responders and non responders. Comparisons between groups were performed using chi-square test and two-tailed Student's t test for independent samples, as appropriate.

- main predictors of compliance and improvement were investigated by means of CHAID test (Chi-square Automatic Interaction Detection) (31), which is an exploratory method used to study the relationship between a dependent variable and a series of predictors variables. The developed model is a data partitioning tree that shows how major "types" formed from the independent (predictor or 'splitter') variables differentially predict a criterion or dependent variable. In this study, drop-out percentage and weight loss percentage at endpoint were entered in the model as dependent variables, and baseline BMI, demographic data (sex, age), Axis I and Axis II diagnoses, clinical features (EDI-2, Ham-D and Ham-A scores), and personality features (TCI, TAS and SIDP-IV dimensional scores) were entered as independent or 'splitter' variables.

Finally, CHAID results were used to divide the whole obese sample in subgroups according to the presence or absence of the 'splitter' variables for compliance and outcome.

To address the second study question (that is, if the identified obese subgroups show different predictors of compliance and outcome) we then tested baseline clinical and personality variables in each subgroup as potential predictors of drop-out rate and weight loss percentage in logistic and stepwise regression analyses.

Data were analysed using SPSS for Windows, version 11.0.

### **Results**

Fifty-three (77.9%) obese patients completed the eight-month treatment, while 15 (22.1%) did not. Among those who completed treatment, 30 patients (44.1% of the whole sample) improved during treatment, showing a weight loss equal to or higher than 10% of initial body weight; 23 patients (33.8% of the whole sample) did not show such an improvement. So, for obese patients who completed treatment, the overall response rate was 56.6%, while non-responders were 43.4%.

#### *Variables associated with treatment compliance*

Sex distribution and age were not significantly different between patients who completed follow up (11.3% male, 88.7% female; mean age 38±12.2) and those who dropped out of the treatment before T1 (13.3% male, 86.7% female, mean age 42.2±14.5) (respectively  $\chi^2=0.05$ , Fisher's exact test=1, df=1; and  $t=1.12$ ,  $p=0.27$ ,  $df=66$ ).

Patients who completed follow up showed, at baseline, a higher prevalence of Axis I disorders in general (64.2%,  $n=34$ ) than patients who dropped out of treatment (33.3%,  $n=5$ ). The two groups did not differ with respect to specific Axis I disorders rates (anxiety disorders, mood disorders, BED) and to Axis II diagnoses rate (Table 1).

Moreover, EDI 'drive for thinness' score at baseline was higher for patients who completed follow up ( $8.3\pm 6.1$  vs  $4.3\pm 4.0$ ,  $t=-2.22$ ,  $p=0.03$ ,  $df=66$ ).

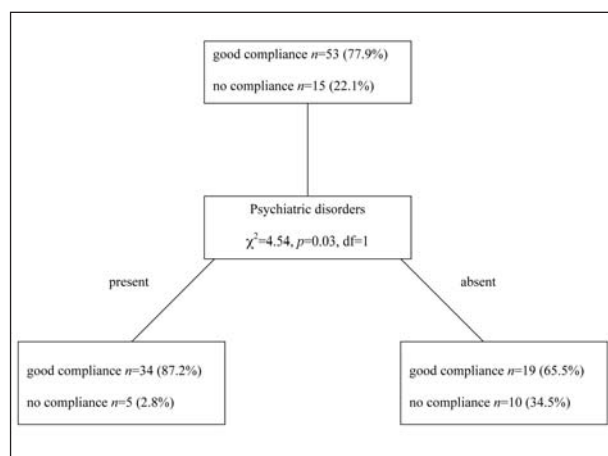
No differences between obese patients who completed follow up and those who did not with respect to baseline BMI, Ham-D, Ham-A, TCI, TAS and SIDP-IV dimensional scores were found (data not shown).

Using CHAID, the main splitter variable which differentiates obese patients who completed follow up and those who did not is the presence of an Axis I diagnosis (Figure 1). Obese subjects with psychiatric disorders were more likely to complete the eight-month

**Table 1.** Psychiatric (Axis I) and personality (Axis II) disorders rates in patients who completed follow up (n=53) and patients lost at follow-up (n=15) (df=1)

	Group with follow-up	Group lost at follow-up	$\chi^2$	p <sup>a</sup>
Any Axis I diagnosis	64.2%	33.3%	4.54	<0.05
Mood disorder	13.2%	0%	2.21	n.s.
Anxiety disorder	26.4%	13.3%	1.11	n.s.
Binge eating disorder	28.2%	28.6%	0.13	n.s.
Any Axis II diagnosis	28.2%	28.6%	0	n.s.

a: Fisher's exact test

**Figure 1.** Compliance data partitioning tree (n=68)

follow-up (87.2%) when compared with obese subjects without psychiatric disorders (65.5%). Conversely, drop-out rate was lower for patients who presented with Axis I disorders (12.8%) than for patients without Axis I disorders (34.5%).

Logistic regression analyses were then performed in order to establish predictors of drop-out rate (dependent variable) in obese patients with and without

psychiatric disorders; baseline BMI, Ham-A, Ham-D and EDI scores, TAS, TCI and dimensional SIDP-IV scores were entered in the model as independent variables. No significant regression models were found for either of the two groups.

#### *Variables associated with treatment outcome*

Sex distribution and age did not vary between responders (10% male, 90% female; mean age 39.5±13.2) and non responders (13% male, 87% female; mean age 36.1±10.8) (respectively  $\chi^2=0.12$ , Fisher's exact test=1, df=1; and  $t=-0.99$ ,  $p=0.33$ , df=51).

Responders (n=30) differed from non-responders (n=23) in observed rates of baseline Axis I and Axis II disorders: non-responders were more likely to have a psychiatric disturbance than responders (82.6%, n=19, vs 50%, n=15), and specifically diagnosed with BED (39.1%, n=9, vs 13.3%, n=4), as well as a personality disorder diagnosis (52.2%, n=12, vs 10%, n=3) (Table 2).

No differences between responders and non responders with respect to baseline BMI, Ham-D, Ham-A, EDI, TAS, TCI and SIDP-IV dimensional scores were found (data not shown).

**Table 2.** Psychiatric (Axis I) and personality (Axis II) disorders rates in responders (n=30) and non-responders (n=23) obese patients (df=1).

	responders	non-responders	$\chi^2$	p <sup>a</sup>
Any Axis I diagnosis	50%	82.6%	6.01	<0.05
Mood disorder	10%	17.4%	0.62	n.s.
Anxiety disorder	26.7%	26.1%	0	n.s.
Binge eating disorder	13.3%	39.1%	4.68	<0.05
Any Axis II diagnosis	10%	52.2%	7.84	<0.01

a: Fisher's exact test

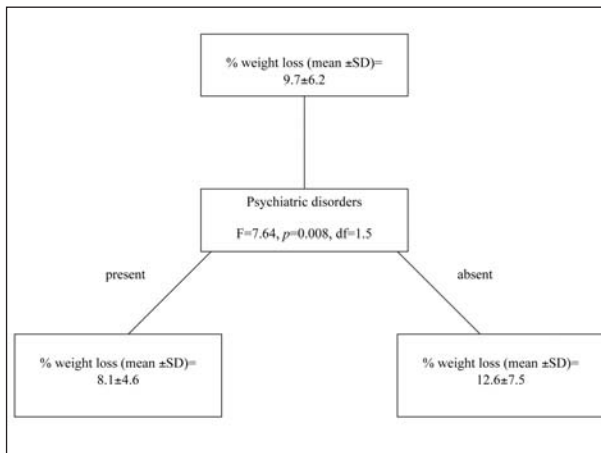


Figure 2. Outcome data partitioning tree (n=53)

According to CHAID, the absence of Axis I diagnoses is the main splitter variable which discriminates obese patients who improved during treatment from those who did not. Obese subjects free from psychiatric disorders at baseline were more likely to achieve a higher weight-loss percentage at endpoint ( $12.6 \pm 7.5\%$ ) than subjects who presented with psychiatric disorders ( $8.1 \pm 4.6\%$ ) (Figure 2).

In order to detect predictors of weight loss percentage (dependent variable) in patients with and without psychiatric disorders we used stepwise regression analyses entering baseline BMI, EDI, Ham-D and Ham-A scores TCI scores, SIDP-IV dimensional scores, and TAS scores in the model as independent variables. Obese subpopulations with and without any Axis I disorder showed different predictors of weight loss (Table 3). Specifically, response predictors for the obese subgroup with an Axis I diagnosis were low scores on the TAS2 factor 'difficulty describing feelings' and low scores on the RD3 TCI subscale 'attachment

Table 3. Predictors of weight loss percentage in obese patients with (n=34) and without (n=19) psychiatric (Axis I) disorders

Obese subgroups	Predictors	$\beta$	p	adj. R <sup>2</sup>
Axis I disorder				
Present	TAS2+RD3	-.713;-.631	0.002	.520
Absent	Narcissistic traits	-.925	0.025	.806

TAS 2: difficulty communicating and describing feelings; RD3 attachment vs detachment; narcissistic traits: SIDP-IV narcissistic dimensional scores

vs detachment' (respectively  $p=0.002$  and  $p=0.004$ ), while for the obese subgroup without an Axis I diagnosis predictors were low SIDP-IV narcissistic dimensional scores.

## Discussion

The aim of this study was to evaluate the hypotheses that, in obese patients attending an eight-month behavioural weight control program, 1) pre-treatment psychopathological variables may constitute risk factors for poor adherence and responsiveness to treatment; and 2) to evaluate whether obese patients with psychopathological risk factors for poor compliance and/or outcome also show different predictors of compliance and weight loss compared with subjects not at risk.

The major findings of the study seem to confirm both hypotheses.

With respect to the first one, the presence of a baseline Axis I disorder protects from drop-out risk during treatment, but lowers weight loss probability. With respect to the second hypothesis, obese patients exposed to risk factors for poor outcome (namely presence of any Axis I disorder) further show different psychopathological and psychological predictors of outcome than non-exposed patients.

Specifically, with regard to treatment compliance, obese subjects who presented with a psychiatric disorder were more likely to complete the eight-month follow up than subjects who were free from psychiatric diagnoses. A potential interpretation could be that obese patients with a comorbid psychiatric disorder suffer from more psychological distress and/or impairment than obese patients without psychiatric disorders, which in turn could lead to a higher motivation to change and to continue treatment. Such patients could view achieving weight loss and thinness as an opportunity to avoid unpleasant psychological states and to improve an unsatisfactory lifestyle. Consistently, a high baseline EDI 'drive for thinness' was the only variable which differed between compliant and non-compliant patients. Thus, psychiatric comorbidity in the obese could promote good adherence to weight-reduction programs by enhancing patients' motivation to lose weight.

With regard to treatment outcome, however, patients with Axis I disorders at baseline were less likely to lose weight during the eight-month follow-up than patients without Axis I disorders. Taken together, the above findings could suggest that, in addition to behavioural weight-reduction interventions, psychiatric disturbances should be a focus of therapy in order to enhance weight loss probability. Alternatively it could be that, given that Axis I comorbidity in the obese predicts good adherence to and motivation for treatment, but also poor response to behavioural weight control programs, psychiatrically ill obese patients could be more successfully matched to other types of obesity therapies (i.e. surgery or medication). Whatever the case, these results confirm the suggestion (15) that psychiatric comorbidity should be taken into account for initial assessment and treatment planning of obese patients who request weight-loss treatment.

The finding that the presence of Axis I disorders constitute a risk factor for poor outcome in the obese is consistent with previous reports of poor response to weight-loss treatments among psychiatrically disordered obese patients (10). However, results from this study allow some suggestions about the mechanism through which, in obese patients, psychiatric disturbances are related to poor outcome in weight-reduction programs. In obese patients with a psychiatric disorder, poor outcome is predicted by difficulty in describing feelings to others and sharing inner experiences (TAS2) and by disinterest or difficulty in engaging in social relationships (low RD3) (32); such a personality style may prevent these patients from building a collaborative relationship with the clinicians. It has already been recognised that the quality of the patient-provider communication may improve outcomes of chronic medical illnesses, i.e. diabetes (33, 34); similarly, paying attention to the patients' communication difficulties could improve outcome in the obese subgroup with psychiatric disorders. Conversely, in obese patients free from psychiatric disorders weight loss is favoured by the presence of low narcissistic personality traits (i.e. lower expectations of unlimited success) (9); thus, in this obese subgroup clinicians could usefully encourage a more sensible approach to behavioural weight-control programs (e.g. emphasising acceptan-

ce of a 'reasonable weight' instead of an unrealistic weight loss) (35).

This study has several limitations, mainly concerning the small sample size, that make further research necessary to generalize the results. For instance, this weakness affects the results about outcome prediction in different obese subgroups, raising questions of adequacy of statistical power and the possibility of chance findings. Moreover, this small clinical sample of obese patients cannot be considered as representative of the entire population of obese patients, many of whom do not seek any treatment, or ask for other interventions (for instance surgery) than a behavioural weight-control treatment. Thus, the results of this study should be regarded as exploratory findings and must be formally tested on independent and larger case series of obese patients.

In conclusion, the results of this study suggest that, in obese patients attending weight reduction programs, identifying psychopathological predisposing or resistance factors to treatment compliance and outcome could help in differentiating the intervention that may lead to improved treatment outcome in diverse obese subgroups. Specifically, acknowledging that personality differences among obese subgroups (i.e. with and without psychiatric disorders) account for different treatment responses may improve the clinicians' understanding of their patients and of perceived treatment resistance, and possibly suggest targeted intervention approaches.

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Correspondence: Prof. Carlo Maggini

Unit of Psychiatry

p.le Matteotti 9

43100 Parma, Italy

Tel. +39-0521-703508

Fax +39-0521-230611

E-mail: psichiat@unipr.it, www.actabiomedica.it