Personality profiles between obese and control subjects assessed with five standardized personality scales

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Background/aim. Psychopathology may exert influence on developing and maintaining obesity. Studies of personality traits or psychopathology of personality in obesity are scarce and contradictory. The aim of this study was to compare personality profiles between obese and normal-weight subjects and to determine the most useful tool to detect differences, considering that psychological assessment and psychotherapeutical support should be included within the overall management of these patients.*

Method. We examined 55 obese subjects (mean BMI=43kg/m^2) and 66 controls (mean BMI =21.7kg/m^2). We used the personality assessment tools: MCMI-II, TCI-R, EPQ-A, BIS-111 and SSS. Factorial multivariate analysis of variance was applied; with factors BMI, Gender and Age as a covariate.

Results. Significant differences between groups were more marked in the clinical syndrome scales of MCMI-II, particularly in Major-Depression, Thought-Disorder, Anxiety, Somatoform and Alcohol-Dependence. Among obese, women scored higher than men in all scales but not significantly. We have found significant differences in normal personality dimensions between both groups in TCI-R. Obese showed higher scores in Harm Avoidance, and lower in Novelty Seeking, Persistence and Self-transcendence. The remaining tests have not been useful for differentiating personality traits between both groups.

Conclusion. Obese subjects showed different personality profiles than control subjects. The most useful scales for determining these differences might be those designed to assess pathological personality such as MCMI-II. Less important would be those intended to measure normal personality traits, such as TCI-R and EPQ-A.

Keywords: Obesity, Personality, Personality Inventory, Millon Clinical Multiaxial Inventory, Temperament and Character Inventory

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Perfiles de personalidad entre sujetos obesos y control medidos con cinco escalas estandarizadas de personalidad

Introducción. La psicopatología puede ejercer influencia en el desarrollo y mantenimiento de la obesidad. Los estudios sobre los rasgos de personalidad o la psicopatología de la personalidad en obesidad son escasos y contradictorios. El objetivo de este estudio fue la comparación de los perfiles de personalidad entre sujetos obesos y normo-peso y la determinación de la herramienta más útil para la detección de diferencias, considerando que la evaluación psicológica y el apoyo psicoterapéutico deberían incluirse en el manejo de estos pacientes.

Metodología. Examinamos 55 sujetos obesos (IMC=43kg/m^2) y 66 controles (IMC=21,7kg/m^2). Empleamos las herramientas de valoración de la personalidad: MCMI-II, TCI-R, EPQ-A, BIS-111 y SSS. Aplicamos un análisis multivariado de la varianza incluyendo los factores IMC, sexo y edad como covariables.

Resultados. Se encontraron diferencias significativas más marcadas entre los grupos fueron más marcadas en las escalas clínicas del MCMI-II, especialmente en la de Depresión Mayor, Pensamiento psicótico, Ansiedad, Histeriforme y Abuso de alcohol. Entre los obesos, las mujeres puntuaron más que los hombres en todas las escalas, aunque no fue significativo. Encontramos diferencias significativas en los rasgos normales de personalidad entre ambos grupos en el TCI-R. Los obesos presentaron mayores puntuaciones en Evitación del daño y menores en Búsqueda de novedad, Persistencia y Trascendencia. El resto de los test no presentaron utilidad para la diferenciación de los rasgos de personalidad entre ambos grupos.

Conclusión. Los sujetos obesos presentaron distintos perfiles de personalidad que los sujetos control. Las escalas de mayor utilidad para la determinación de estas diferencias podrían ser aquellas diseñadas para la evaluación de la personalidad patológica, tales como el MCMI-II. De

menor importancia serían aquellas dirigidas a medir los rasgos de personalidad normal, tales como el TCI-R y el EPQ-A.

Palabras clave: Obesidad, Personalidad, Inventario de Personalidad, Inventario Clínico Multiaxial de Millon, Inventario de Temperamento y Carácter

INTRODUCTION

Obesity is a high prevalence disorder that seems to be unrelentingly spreading over the world, especially in developed countries. At the turn of 21st century, it is thought to be the epidemic with greatest prevalence and incidence in the USA and other countries.[1-4]

Up to the present time, biological aspects have been the primary objective in the tackling of the illness. However, as it has also been described, subject's psychological traits are connected to the evolution of obesity.[5-7] This makes necessary to assess and consider such psychological aspects for the appropriate treatment of such patients.

Many studies suggest the existence of comorbidity between morbid obesity and psychopathology.[5, 8-12] An association between overweight and risk of suffering from a DSM-IV Axis I or Axis II disorder has also been found.[13] Some researchers consider that psychopathological disturbances may constitute one of the most important complications in obesity.[14] However, others have not found high rates of mental disorders among obese individuals in comparison to non-obese subjects.[15, 16] In addition, a tendency for higher prevalence in psychiatric disorders has been found among obese patients,[17-19] being anxiety and depression the most frequent ones.[5, 20-25]

Several authors have tried to figure out the existence of a specific psychopathological profile in morbidly obese patients. Nevertheless, results are controversial.[8, 26] This may be partly due to a lack of consensus about assessment and the use of non-standardized tools.[15, 20]

Obesity tends to be considered as a chronic illness and thus probably interacts with the individual's most accentuated personality traits. Personality, understood as a psychological construct persisting in time, confronted by different situations and able to distinguish an individual from any other, could be the base ground where basic differential patterns lay with regard to normal weight subjects. Therefore, personality traits in obese patients, albeit less studied, may be of utmost importance.

Data on this issue is controversial. Some authors suggest that obese patients' personality profile is somehow different from that of the general population,[27, 28] whereas others think that there is no differential personality pattern in obese individuals.[29]

Research supporting the existence of different personality traits between obese subjects versus normal weight subjects, do it so according to the following: pathological personality profiles,[9, 28, 30] profiles related to scales designed to measure normal personality traits,[31-35] or according to impulsivity measurements.[36] We believe that by studying these traits within the same group of patients and controls with normal weight, greater information regarding an integral personality profile will be available.

The principal aims of the present paper are the following: to discover whether there are significant differences in personality profiles between obese subjects and control (normal weight) subjects by administering five instruments covering the referred set of traits, to determine which of these scales show greater differences between both groups, and lastly which subscales define the principal differential traits.

METHODS

A case-control study was designed.

- Participants:

  Participants were recruited from subjects who consecutively were admitted in the Obese Unit of the Hospital Clínico San Carlos in Madrid, between October 15th 2009 and October 30th 2010.
  The group was composed by 55 subjects (38 females and 17 males) fulfilling the following inclusion criteria: to be between 18 and 65 years of age, BMI=30kg/m^2 or higher, Caucasian race. Exclusion criteria: presence of any DSM-IV-TR axis I disorder (either the subject or a first-degree relative), mental retardation, to be under 18 years of age or over 65 years of age, refusal to sign the informed consent. Of the 68 subjects who met the inclusion criteria, 7 were not willing to participate, 4 were excluded for presenting psychiatric disorders and 2 were excluded for being under 18 years of age.
  The group control was composed by 66 volunteer subjects (38 females and 28 males) who were partners of the patients included in the study or friends of the research team members, all having a BMI between 18.5Kg/m^2 y 24.9Kg/m^2 and paired in sex and age frequencies.
  Patients were evaluated with the Structured Clinical Interview for DSM IV (SCID-I) and control subjects were administered the SCID-I non-patient version to reject any previous psychiatric history.

The study protocol was performed in accordance with the Declaration of Helsinki and Good Clinical Practice

Guidelines and has been approved by the San Carlos Clinical Hospital Ethics Committee. All participants provided written informed consent approved by this Committee after the procedure had been fully explained.

- Measures/Instruments
- Personality Assessment.
  Personality traits were assessed by completing five self-administered questionnaires that were subsequently corrected by two trained psychologists from the Institute of Psychiatry and Mental Health (Hospital Clínico San Carlos).

  Millon Clinical Multiaxial Inventory, second Edition (MCMI-II)[37]
  It includes several scales which measure personality disorders, based on Millon's bio-psico-social personality theory. It is composed of 175 true-false statements. It is modelled on 22 scales divided in four groups: 10 basic personality patterns scales (1. Schizoid, 2. Avoidant, 3. Dependent, 4.Histrionic, 5. Narcissistic, 6A. Antisocial, 6B. Aggressive-sadistic, 7. Compulsive, 8A. Passive-aggressive, 8B. Self-defeating); 3 severe personality disorder scales (S. Schizotypical, C. Borderline, P. Paranoid), 6 clinical syndrome scales (A. Anxiety, H. Somatoform, N. Hipomania, D. Dysthymia, B. Alcohol dependence, T. Drug dependence) and 3 severe clinical syndrome scales (SS. Though disorder, CC. Major Depression, PP. Delusional disorder).

  Temperament and Character Inventory, revised edition (TCI-R)[38]
  This tool assesses personality according to Cloninger's theory. It consists of 240 5-point Likert-type scale items. It includes seven personality dimensions, with four temperamental traits (Novelty Seeking, Harm Avoidance, Reward Dependence and Persistence) as well as three characterdimensions(Self-Directedness,Cooperativeness and Self-trascendence).

  Eysenck Personality Inventory-A (EPQ-A) [39]
  It is a 94-item self-administered questionnaire that measures the three core bipolar dimensions in Eysenck's personality theory: Neuroticism (N), Extraversion (E) and Psychoticism (P).

  Barrat Impulsiveness Scale-11 (BIS)[40]
  BIS is one of the most commonly used tools to assess impulsiveness. It consists of 30 items contained in three subscales: Motor Impulsiveness, Cognitive Impulsiveness and Unplanned impulsiveness. These three subcomponents are taken altogether to ascertain Total impulsiveness.

  Sensation Seeking Scale (SSS)[41]
  It aims to measure Sensation Seeking. This trait was defined by Zuckerman as the "tendency to seek novel, varied, complex, and intense sensations and experiences and the willingness to take risks for the sake of such experience". It is made up of 40 yes-no items and consists of four subscales: Thrill and adventure seeking (BEM), Experience Seeking (BEX), Disinhibition (DES) and Boredom Susceptibility (SAB).
- Eating Disorders Assessment.
  In order to assess the influence of possible eating disorders in personality characteristics, the following instruments were administered to obese subjects: Eating Disorders Inventory (EDI)[42] and the Bulimic Investigatory Test Edinburgh (BITE).[43] EDI scores were obtained from subscales Drive for Thinness (DT) y Body Dissatisfaction (BD), as well as from the symptom scale. The established cut-off points to distinguish normal from pathological were made according to the scales' author (≤14 vs >14 for subscale DT from EDI and BITE symptom scale, and ≤17 vs. >17 for subscale BD from EDI).
- Statistical Analysis
  Variables of the different personality scales are expressed with their means and standard deviations, except for those showing asymmetric distributions which are expressed with their medians and quartiles. Scores corresponding to MCMI-II variables are expressed in Base Rate, those corresponding to TCI-R are expressed in percentiles, and those included in the EPQ-A, BIS and SSS are expressed in direct scoring. The one-sample Kolmogorov-Smirnov Z-test was used to determine how well the variables fit in a normal distribution. The hypothesis of equality of variances was tested with Levene test. We used the *t* test for independent samples in order to compare age means between groups as well as to contrast the hypothesis of equality of medians in personality variables among the group control and the normative population, and the median test to compare scores of variables expressed with its own use. For parametric variables, a factorial multivariable analysis of variance (based on the General Linear Model) was carried out, taking principal effect of group (obese vs. control), interaction of group by Gender. In non-parametric variables we used Mann-Whitney U test for independent samples.
  For the obese group, T test was used to contrast score means of personality variables studied in the group, being expressed over or under the established cut-off points for the following scales: DT and BD from EDI and symptoms of the BITE scale. In all cases a bilateral significance level $\alpha<0.05$ was considered. Statistical analysis was performed using SPSS 15.0 for WINDOWS.

RESULTS

- Demographic characteristics.
  The mean age (SD) of the obese and control group was 38.5 (10.16) and 34.9 (10.52) years respectively. No

significant differences in age were observed between both groups (p=0.060). The obese group consisted of 38 females (69.1 %), mean age (SD) of 37.6 (9.7) years and mean BMI (SD) of 43.9 (7.2) Kg/m^2, and 17 males (30.9%), mean age (SD) 40.8 (11.2) years and mean BMI (SD) of 40.1 (7.0) Kg/m^2. The control group consisted of 38 females (57.6%), mean age (SD) 33.5 (8.6) years and mean BMI of 21.1 (2.1) Kg/m^2, and 28 males (42.4%) of mean (SD) 36.9 (12.6) years of age and mean (SD) BMI of 23.2 (2.1) Kg/m^2. No significant differences in sex were observed between both groups (p=0.257). There were no differences either in age among obese and controls in the male group (p=0.292) or female group (p=0.060).

- Eating Disorder Assessment.
  Obese subjects obtained median (IQR) scores of 6.0 (3.0-9.5) and 18.0 (12.0-23.0) in the DT and BD subscales from the EDI inventory, as well as 7.5 (3.7-17.0) in the BITE scale (Symptom scale). No differences were found between males and females in none of the following [median (IQR)]: EDI DT 3.0 (2.0 -9.5) vs. 6.0 (3.0-9.7) p=0.370; EDI BD 12.0 (6.5-20.0) vs. 18.5 (13.0-23.5) p=0.343 and BITE 10.0 (6.0-21.0) vs. 7.0 (3.0-15.5) p=0.999. Five subjects (9%) scored over 14 in the DT scale and 29 subjects (52%) scored over 17 in the BD scale, both scales belonging to the EDI inventory, and 17 subjects (31%) exceeded 14 points in the BITE symptom scale.

- Personality Assessment.
  Table 1 shows Base Rate scores for the obese and control groups. Medians corresponding to Antisocial, Aggressive, Sadistic, Paranoia, Drug-Dependence variables and the mean for Delusional-Disorder in the group control, were shown under the same confidence intervals of corresponding data for the normative population. This invalidates the differences found in scores regarding the obese group.
  Obese subjects showed higher significant scores in basic personality scales (Narcissistic) (p=0.020), in severe personality disorder scales (Borderline) (p= 0.032) in moderately severe clinical syndromes (Anxiety [p<0.001], Somatoform [p=0.010], Dysthimia [p<0.001] and Alcohol dependence [p=0.006]) as well as in severe clinical syndromes (Major Depression [p<0.001]).
  Within the obese group, we found existing differences in the scores for the Borderline variable [mean (SD), 68.0 (29.5) vs. 38.4 (15.9); p=0.018] among those scoring over 14 in the BITE symptoms scale and those scoring under respectively. After removing the influence of subjects "BITE>14", differences between obese and Borderline controls were no longer significant [median (IQR), 36.5 (25.2-51.5) vs. 28.0 (17.0-28.0) p=0.169]. No differences were found in any variable between obese subjects with scores over and under the established cut-off points for subscales DT and BD of the EDI inventory.
  Gender interaction can be observed in the following variables: Anxiety (p=0.021), Somatoform (p=0.024), Alcohol Dependence (p=0.035) and Major Depression (p=0.041). Within the female group, differences in all these variables were produced. Obese subjects showed higher scores compared to the control group. However, no differences were found between obese subjects and controls in the male group (Table 2).
  Table 3 shows TCI-R and EPQ scores in obese and control subjects. The obese group shows significant lower scores in Persistence (p=0.004) and Self-Transcendence (p=0.034), and higher scores in Harm Avoidance (p=<0.001). There were no significant scores for the interaction effect between group and gender. Although obese subjects with scores >14 in the BITE inventory showed higher scores in Self-Directness in comparison to the others [mean (SD), 18.1 (27.6) vs. 58.8 (29.0); p=0.001], by removing the effect of those "BITE>14" the no-existence of differences between obese subjects and the control group was maintained [median (IQR), 52.0 (13.0-79.5) vs. 57.0 (20.0-84.2); p=0.701]. No significant differences were found in any variable situated over or under the established cut-off points for the EDI's DT and BD subscales in the obese group.
  Gender interaction effect (p=0.044) was found in the Persistence scale. Differences between obese subjects and controls were shown in the female group (p=0.012), however no differences were found in the male group (p=0.155) (Table 2).
  There were no differences in any EPQ scales. There was no significant interaction between group and Gender. Within the obese group, for those subjects scoring over 14 in the BITE symptom scale, higher scores were found in Neuroticism [mean (SD), 16.2 (7.0) vs. 10.1 (5.3); p=0.014]. However by removing the effect of those "BITE>14" the no-existence of differences was maintained between the obese and control groups [mean (SD), 12.2 (6.3) vs. 10.5 (4.9); p=0.140]. DT and BD variables from the EDI inventory, showed no differential effects in any variable.
  Table 4 shows BIS-11 and SSS scores for obese and control subjects. There are no significant differences in any of the variables captured in the Barrat Impulsiveness Scale between obese subjects and controls. There were no Gender interaction effects, or scoring differences between the obese and control groups in the DT and BD variables from the EDI symptom scale.
  Scores corresponding to variables in the SSS scale were not found to be different between the obese subjects and controls. Accordingly, no Gender interaction effects, or influence of DT and BD variables from the EDI and the BITE symptoms scale were found.
  Fig. 1 shows the obtained differential profile between obese subjects and controls.

Tabla 1 MCMI-II Base Rate scores for the obese and control group

	Obese Group n= 55		Control Group n= 66		Univariate p
1.Schizoid (1)	49.0	31.5-75.5	39.0	23.0-68.2	0.071
2.Avoidant (1)	24.0	13.50-45.0	16.0	7.0-41.0	0.111
3.Dependent (1)	57.0	32.5-84.5	62.5	36.7-90.5	0.593
4.Histrionic (2)	67.0	28.7	61.8	29.2	0.644
5.Narcissistic (2)	72.5	28.9	54.7	29.4	**0.020**
6A.Antisocial (1)	68.0	27.0-93.0	**36.5**(-)	14.0-59.5	**0.018**
6B. Aggressive-Sadistic (1)	62.0	33.0-92.0	**34.0**(-)	18.0-65.5	**0.003**
7.Compulsive (2)	84.3	32.4	84.5	26.8	0.947
8A.Pasive-Aggressive (1)	41.0	18.0-74.0	23.0	12.0-37.0	0.111
8B.Self-Defeating (1)	21.0	12.5-49.5	18.5	9.0-47.5	0.951
S.Schizotypal (1)	47.0	28.5-71.5	33.5	20.0-53.2	0.071
C.Bordeline (1)	41.0	26.0-61.0	28.0	17.0-43.2	**0.032**(**)
P.Paranoid (1)	76.0	43.0-104.0	**49.0**(-)	20.0-67.0	**0.010**
A.Anxiety (2)	57.2	24.1	36.6	17.6	**<0.001**(*)
H.Somatoform (1)	61.0	35.5-85.0	37.0	26.7-54.0	**0.010**(*)
N.Hipomania (1)	55.0	32.0-84.5	41.5	18.7-80.2	**0.298**
D.Dysthimia (2)	51.9	22.2	34.2	16.4	**<0.001**
B.Alcohol-Dependence (1)	53.0	19.5-70.5	22.0	8.0-44.2	**0.006**(*)
T.Drug-Dependence (1)	57.0	24.5-84.5	**30.0**(-)	14.0-57.7	**0.018**
SS. Thought-Disorder (1)	51.0	27.0-79.0	28.0	12.0-55.0	0.071
CC.Major-Depression (1)	34.0	14.5-59.5	13.0	5.0-24.2	**<0.001**(*)
PP. Delusional-Disorder (2)	73.4	31.2	**53.1**(-)	27.5	**0.003**

(1) Data expressed as median and quartiles. (2) Data expressed as mean and standard deviation. (-) Below the normative data confidence interval.
(*) Gender interaction p< 0.05. (**) BITE confusion

DISCUSSION

Different personality traits may play a significant role in the triggering and maintenance of obesity. However, data in literature is sometimes controversial and on the other hand, the personality assessment is conducted partially. Thus we consider that in studying together pathological traits (MCMI-II), and other considered normal traits (TCI-R, EPQ-A, BIS-11 and SSS scales) in the populations of obese subjects and controls, could allow for more information on the differential personality profile between both populations in a more ample way.

In concordance with other authors' results,[9, 28, 30] we found that obese subjects score higher in several MCMI-II variables, both in personality and clinical syndromes scales.

After including gender, age and eating disorder symptoms (EDI, BITE) as possible misleading variables and

Table 2 Difference by gender in MCMI-II and TCI-R scores

	Interaction p	Males n= 45					Females n= 76				
		Obese Group n= 17		Control Group n= 28		Univariate p	Obese Group n= 38		Control Group n= 38		Univariate p
A. Anxiety (2)	0.021	48.1	18.1	38.8	17.7	0.074	60.8	25.5	34.9	17.6	**<0.001**
H. Somatoform (2)	0.024	55.9	24.9	50.4	21.5	0.473	64.9	28.5	36.6	20.5	**<0.001**
B. Alcohol-Dependence (1)	0.035	26.0	12.5-60.2	26.0	11.0-49.0	0.828	57.0	24.0-77.0	19.0	8.0-40.0	**0.009**
CC. Major-Depression (1)	0.041	26.0	14.2-39.2	19.0	3.0-42.0	0.659	39.0	13.0-63.0	10.0	5.0-19.0	**0.001**
Persistence (1)	0.044	35.0	19.5-66.0	61.5	24.2-79.7	0.155	20.0	7.2-76.2	56.5	39.5-80.7	**0.012**

(1) Data expressed as median and quartiles. (2) Data expressed as mean and standard deviation

Table 3 TCI-R and EPQ scores in obese and control subjects

	Obese Group n= 55		Obese Group n= 66		Univariate p
TCI-R					
Novelty Seeking (1)	36.0	24.0-80.0	59.0	32.2-80.0	0.078
Harm Avoidance (1)	69.0	52.0-90.0	47.0	23.2-68.2	**<0.001**
Reward Dependence (1)	60.0	23.0-84.0	60.0	39.0-86.2	0.594
Persistence (1)	20.0	9.0-68.0	58.0	35.0-80.0	**0.004**(*)
Self-Directedness (1)	41.0	9.0-77.0	57.0	20.0-84.2	0.507
Cooperativeness (2)	52.3	26.7	58.2	28.6	0.225
Self-Trascendence (1)	37.0	16.0-68.0	59.0	38.0-84.0	**0.034**
EPQ-A					
Neuroticism (2)	12.8	6.5	10.5	4.9	0.082
Extraversion (2)	12.6	3.7	13.3	3.8	0.269
Psychoticism (1)	2.0	1.0-4.0	1.0	0.0-2.0	0.123

(1) Data expressed as median and quartiles. (2) Data expressed as mean and standard deviation. (*) Gender interaction p< 0.05

after dismissing those variables showing scores under the normative means for the control group, scales showing significant differences between the obese and control groups were the following: Narcissistic, Anxiety, Somatoform, Dystimia, Alcohol-Dependence and Major-Depression. In separating the sample in gender, we observed that differences in Anxiety, Somatoform, Alcohol-Dependence, Major-Depression, were only produced within the female population.

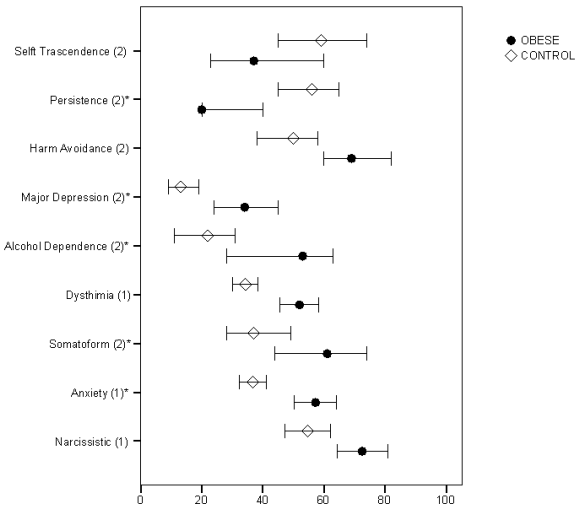
These results convey a greater vulnerability for a psychological disruption within the female obese population. This data could be congruent with the idea of the physical image playing a more important role in women,[44-46] and thus obesity could have a differential psychic impact in both sexes.

Although in the present study we cannot determine whether obesity is a cause or a consequence of these disruptions, existing scientific evidence points out the possible influence of such illness in the presence of affective disorders,[47-49] as well as in personality disorders.[50, 51]

We have also found statistical significant differences in scores from other personality dimensions measured through TCI-R in both groups. Obese subjects show significantly higher scores in Harm Avoidance and lower scores in Persistence and Self-transcendence. However when we compare scores between obese subjects and controls in this

Table 4 Scores in impulsiveness (BIS-11) and Sensation Seeking (SSS) in obese and control group

	Obese Group n= 55		Control Group n= 66		
	Mean	SD	Mean	SD	p
BIS-11					
Cognitive I	13.2	3.5	12.6	3.8	0.615
Motor I	15.2	6.6	14.0	5.9	0.624
Unplanned I	17.4	7.4	14.8	5.3	0.064
Total I		13.0	41.4	11.2	0.164
SSS					
Boredom Susceptibility	3.1	1.7	3.2	1.8	0.805
Experience Seeking	5.5	1.9	5.0	2.2	0.202
Disinhibiton	3.1	1.7	3.3	2.4	0.434
Thrill and adventure seeking	3.6	2.6	4.5	3.0	0.074
Total Sensation Seeking	15.6	5.2	17. 0	7.1	0.146



(1) Data expressed as mean. (2) Data expressed as median.
(*) Gender interaction p< 0.05

Figure 1 *Differential personality profile in obese and control subjects, in MCMI-II and TCI-R subscales (p<0.05)*

inventory, separating populations in gender, we find that differences in Persistence are only produced within the female group.

Other authors have found higher scores for Novelty Seeking in these patients.[31, 32] This controversy may be due to a heterogenic sample of obese subjects in terms of BMI, psychopathology, coping style or adherence to therapy amongst studies. We have not been able to confirm the importance of controlling aspects such as the presence of eating disorders, control group scoring variables with regard to the normative population or the gender of subjects, in order to correctly interpret results.

Results obtained by other authors in EPQ-A[36-39] are controversial, regarding variables in Neuroticism, Extraversion and Psychoticism. We believe this is due to sample differences in terms of age and gender among studies, which as we have seen, have all have a degree of influence on our results. In the present study, we have obtained no significant differences for any scale of this questionnaire.

For the Barrat Impulsiveness Scale (BIS) as well as for the Sensation Seeking Scale (SSS), no differences were obtained in personality traits between the control group and our obese group. Although some author has found differences in impulsiveness measures,[36] possibly due to the fact of sample being a group of morbidly obese with binge eating disorders.

Therefore, we could conclude that obese subjects show significant different personality profiles from those found in normal weight subjects. Greater differences appear within the MCMI-II scales and the TCI-R, and are emphasized in the case of females. Thus it is necessary to consider confounding factors such as gender or eating disorders for a correct interpretation. In future research, it would be interesting to make a longitudinal follow-up using the same type of patients, before, during and after the process of weight loss, aiming at determining new therapeutic targets where personality factors would be considered for the successful assessment of the procedure.

STUDY LIMITATIONS

Among all the possible study limitations, we highlight sample size, which is currently being enlarged.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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