Psychiatria Danubina, 2024; Vol. 36, Suppl. 2, pp 281-287
Conference paper

Original research

IMPULSIVITY AND ANGER IN OBESE PATIENTS UNDERGOING BARIATRIC SURGERY

Leonardo Zebi[1], Marta Barbi[1], Debora Toshi[1], Laura Pastorino[1], Giulia Menculini[1], Veronica Raspa[1], Maria Teresa Paganelli[2], Laura Dalla Ragione[3-4], Simone Pampanelli[5], Patrizia Moretti[1], Alfonso Tortorella[1]

[1]Section of Psychiatry Department of Medicine and Surgery, Psychiatry, University of Perugia, Perugia, Italy
[2]Section of General Surgery, General Hospital of Perugia, Perugia, Italy
[3]Eating Disorders Services-USL N1 "Palazzo Francisci", Todi, Italy
[4]Food Science and Human Nutrition Unit, University Campus Biomedico of Rome, Rome, Italy
[5]Section of Clinical Nutrition and Dietetics, General Hospital of Perugia, Perugia, Italy

SUMMARY

Introduction: *Several studies show an association between obesity, impulsivity, and anger. The condition of obesity has moreover an important correlation with Eating Disorders (EDs), the most frequent of which is Binge Eating Disorder (BED). Obese patients seem to express peculiarities regarding the expression of some emotional processes, including impulsivity, aggression and anger, compared with regular-weight patients and those without an ED.*

Subject and methods: *This is a cross-sectional study carried out on a population of 47 obese patients undergoing bariatric surgery. Patients underwent a psychiatric evaluation at the outpatient clinics of the Section of Psychiatry, Clinical Psychology and Psychiatric Rehabilitation of the University Hospital of Perugia. Levels of anger and impulsivity were characterized using the STAXI-2 and BIS-11 scores. Scores were compared based on sex, the presence/absence of EDs and on the presence/absence of psychiatric disorders attested during the evaluation.*

Results: *No statistically significative difference were detected on STAXI-2 and BIS-11 scores comparing men and women. People diagnosed with EDs had higher scores in the subscores of attention, cognitive complexity, motor impulsivity, non-planning impulsivity, and in the BIS-11 total score. No differences were detected in the STAXI-2 scores. When comparing patients on the presence/absence of psychiatric comorbidities, obese patients with a psychiatric diagnosis had higher scores on the impulsivity measures, but also a higher value on the ER index of the STAXI-2.*

Conclusions: *Obese subjects undergoing bariatric surgery represent a fragile population that must be carefully evaluated from a psychiatric point of view. Indeed, the co-existence of psychiatric comorbidities may underpin the present of trait-like characteristics, such as impulsivity and anger, that should be carefully considered when proposing treatment strategies.*

Key words: *bariatric surgery - impulsivity - anger - psychiatric disorders - eating disorders*

* * * * *

INTRODUCTION

Obesity is a multifactorial condition generally defined by a body mass index of 30 kg/m^2 or higher (Apovian 2016). Obesity and psychiatric disorders are linked by a bi-directional relationship. Compared to the general population, obese patients may express specific psychopathological features and cognitive/emotional processes, such as low self-esteem, body shape unsatisfaction and impulsiveness (Bibiloni et al. 2017, Giel et al. 2017, Slabá et al. 2020). Several studies highlighted that obese persons experience significant impairments and limitations in quality of life and functioning (Taylor et al. 2013).

At the same time, rates of obesity are higher than the average population across a range of psychiatric disorders, such as mood, anxiety, and psychotic disorders (Lopresti et al. 2013). Indeed, a psychiatric evaluation is necessary to investigate mental health, in order to identify and treat these conditions in an early stage (Zebi et al. 2023).

The Eating Disorders (EDs) category of the Diagnostic and Statistical Manual of Mental Disorders (DSM)-V-TR, and particularly Binge Eating Disorder (BED), are most frequently linked to obesity (da Luz et al. 2018). Therefore, impulsiveness has often been associated to BED. In particular, a greater reward sensitivity, specifically, the urge for appetitive stimuli and a greater disinhibited acting with no regard for the consequences, have often been found in patients with BED rather than in patients without BED. The evidence supports the view that BED represents a specific phenotype of obesity with increased food-related impulsivity (Giel et al. 2022)

Impulsivity is defined as the absence of the ability to inhibit an automatic behavior and the tendency to discount future consequences in favor of more immediate outcomes (Sarwer et al. 2019). Impulsivity is positively associated with energy intake and negatively associated with diet quality (Bénard et al. 2019). Furthermore, dietary disinhibition plays a central role in the development of obesity (Filbey et al. 2017, Sarwer et al. 2019).

Several studies showed a reduction on response of caudate nucleus during the consumption of palatable and energy dense food, indicating a dysfunction on the reward circuit (Babbs et al. 2013, Green et al. 2011, Stice et al. 2008).

Anger is a negative affective state that may include increased physiological arousal, thoughts of blame, and an increased predisposition toward aggressive behavior (Berkowitz & Harmon-Jones 2004). Its association to aggressiveness plays a crucial role on EDs development and prognosis (Dingemans et al. 2016, Walenda et al. 2021). Scientific evidence suggests that bariatric surgery could have a positive impact on the psychological comorbidities of obese people, including anger (Roberts 2021). Therefore, patients with BED have the tendency to express higher levels of anger, especially in comorbidity with atypical depression (Güngör et al. 2020).

The aim of this preliminary study is to characterize the presence of impulsivity and anger in a bariatric population of 47 patients, based on their STAXI-2 and BIS-11 scores. We hypothesized that clinically significant levels of impulsivity and anger may be expressed by these patients, with higher values in those suffering from a comorbid ED.

SUBJECTS AND METHODS

This study is a cross-sectional analysis. The population included in the research was evaluated by a multidisciplinary team whose role was to evaluate whether the patient presented psychiatric contraindications to bariatric surgery. Particularly, the presence of mental disorders, including EDs, was assessed during an outpatient evaluation. Indeed, psychiatric disorders could influence the patient's ability to adequately adhere to therapeutic indications and post-operative follow-up.

The patients included in this study underwent a psychiatric evaluation between January 2022 and April 2024 at the outpatient clinics of the Section of Psychiatry, Clinical Psychology, and Psychiatric Rehabilitation of the University Hospital of Perugia. Inclusion criteria were age ≥18 and a good knowledge of Italian language (oral and written).

The evaluation consisted of a clinical interview aimed at identifying psychiatric symptoms, personality characteristics and eating habits, investigating the possible presence of an ED. Furthermore, a self- and hetero-administered tests assessment was performed. In particular, the psychometric tools used in the evaluation were:

- The Structured Clinical Interview for DSM-5 Disorders, clinician version (SCID 5-CV), used to identify the main psychiatric disorders described in the DSM-5 (Osório et al. 2019);
- The Structured Clinical Interview for DSM-5, Personality Disorders (SCID-5-PD), used to identify personality traits or disorders (Hörz-Sagstetter et al. 2017);
- Binge Eating Scale (BES), Bulimia Test Revised (BULIT-R) and Body Shape Questionnaire (BSQ), used to support the identification of any ED (Greeno et al. 1995, Serier et al. 2021, Cooper et al. 1997).

Two scales were used to assess the presence or absence of anger and impulsivity and to evaluate their severity, the State-Trait Anger Expression Inventory-2 (STAXI-2) and the Barratt Impulsiveness Scale-11 (BIS-11) (Spielberger et al. 1992, Barratt 1985)

The STAXI-2, developed by Spielberger in 1988, provides synthetic and representative measures of the experience and expression of anger (Spielberger et al. 1992, Lievaart et al. 2016). The concept of "anger experience" includes two main components: State Anger (S-Anger; emotional state characterized by subjective feeling) and Trait Anger (T-Ang; disposition to perceive a large number of situations as annoying or frustrating). The Trait Anger includes two subscales: Temperament prone to Anger (T-Ang/T; general predisposition to experience or express angry feelings without a specific reason) and Anger Reaction (T-Ang/R; individual differences in being inclined to express anger when being criticized or threatened unfairly by others). The concept of "expression of anger" includes three main components: Anger Out (AX/Out; expression of anger towards other people or objects), Anger In (AX/In; anger turned inwards) and Anger Control (AX/Con; controlling expression of anger).

The BIS-11, on the other hand, is a 30-item instrument designed to evaluate the impulsivity dimension as a behavioral or personality variable. The structure of the instrument allows the identification of 6 first-order factors: Attention (5 items), Motor behavior (7 items), Self-control (6 items), Cognitive complexity (5 items), Perseverance (4 items), and Cognitive instability (3 items). In addition to first order factors, it identifies 3 second order factors: Cognitive Impulsivity (calculated as the sum of attention and cognitive instability), Motor Impulsivity (calculated as the sum of motor behavior and perseverance) and Non-Planning Impulsivity (calculated as the sum of self-control and cognitive complexity). The total score, an expression of general impulsivity, is calculated as the sum of first or second order factors (Barratt 1985, Patton et al. 1995).

All scales have been validated for the Italian population (Comunian 1992, Martinotti et al. 2008, Fossati et al. 2001). People who took part at this study signed informed consent to participate. Data were collected into an electronic database, and then analyzed through the software Statistical Package for Social Science (SPSS), version 26. Descriptive analyses were carried out to evaluate the distribution of variables of interest in the study population. Three sets of bivariate analyses (t-test) were performed to identify significant differences in impulsivity and anger scores obtained at the BIS-11 and STAI-Y tests, stratifying patients as follows: (i) men and women, (ii) subjects with and without EDs, (iii) subjects with or without other psychiatric disorders. Statistical significance was considered for p values <0.05.

RESULTS

The sample was composed of 47 patients, of which 37 were women (78.7%). 72.3% of the subjects were born in Italy. The mean age of the participants at the time of the evaluation was 47.23±10.996 (range 21-70).

Only 19.1% of study participants held a qualification above a diploma. Moreover, 38.3% had never worked at the time of the assessment. 53.2% of the subjects were not married at the time of the evaluation. As many as 59.6% also had a family history of obesity. The average BMI was 41.33±6.244, with a minimum value of 33 and a maximum of 64. Furthermore, BMI was significantly lower in women than in men (40.41±5.293 W vs 44.76±8.404 M p=0.049). The total average of the results obtained by the sample in the BIS-11 is 57.35 (Standard Deviation = 9.967). In Table 1, 2 we report the averages of the results obtained by the sample in the BIS-11 and in the STAXI-2, considering the single items.

Table 1. BIS-11 scores

Bis-11 factors	Average	SD
Total score	57.35	9.967
Attentional Impulsivity	19.33	3.712
Motor Impulsivity	13.59	3.879
Non-planning Impulsivity	24.09	4.727
Attention	8.48	3.089
Motor	12.98	3.088
Self-Control	11.96	3.018
Cognitive Complexity	12.26	2.832
Perseverance	6.35	1.622
Cognitive Instability	5.24	1.689

SD - Standard Deviation

Table 2. STAXI-2 scores

Type of Anger	Average	SD
State Anger	36.33	4.033
Feeling Anger	25.22	1.849
Feel like expressing anger verbally	24.93	1.831
Feel like expressing anger physically	24.22	0.629
Trait Anger	35.98	4.626
Angry Temperament	25.22	1.941
Angry Reaction	26.85	2.494
Anger Expression-Out	35.52	4.108
Anger Expression-In	35.63	5.114
Anger Control-Out	39.57	4.334
Anger Control-In	40.48	6.124
Anger Expression Index	54.28	12.633

SD - Standard Deviation

When comparing test scores based on sex, no significant differences were found between the means of each score and subscore.

Comparing patients based on the presence or absence of eating disorders, people diagnosed with FEDs had higher scores in attention (p=0.010; 10.42 vs 7.79), perseverance (p=0.023; 7.25 vs 6.03), cognitive complexity (p=0.008; 14.80 vs 11.62), motor impulsivity (p=0.006; 16.17 vs 12.68), non-planning impulsivity (p=0.021; 26.75 vs 23.15), and in the BIS-11 total score (p=0.017; 63.17 vs 55.29). Regarding STAXI-2, there were no significant differences between the two samples.

Finally, comparing patients who obtained a psychiatric diagnosis to those who did not, the first group showed higher scores in the attention (p=0.009; 11.80 vs 8.07), perseverance (p=0.032; 7.80 vs 6.17), self-control (p=0.024; 14.80 vs 11.61), motor impulsivity (p=0.004; 18.20 vs 13.02), non-planning impulsivity (p=0.022; 28.60 vs 23.54) scores, and in the BIS-11 total score (p=0.007; 56.00 vs 28.60). As for the STAXI-2, there were significant differences in the value of trait anger (p=0.021; 41.00 vs 35.50), angry temperament (p=0.012; 27.50 vs 25.00) and in the anger expression index (p=0.030; 67.25 vs 53.05).

DISCUSSION

In our study, the sample was composed of 47 patients, of which 37 were women (78.7%). 72.3% of the subjects were born in Italy. The mean age of the participants at the time of the evaluation was 47.23±10.996 (range 21-70). The average BMI was 41.33±6.244, with a minimum value of 33 and a maximum of 64. Furthermore, BMI was significantly lower in women than in men (40.41±5.293 W vs 44.76±8.404 M p=0.049). The total average of the results obtained by the sample in the BIS-11 is 57.35 (Standard Deviation = 9.967). It is important to consider that, when comparing test scores based on sex, no significant differences were found between the means of each score and subscore. On the other hand, when analyzing the results of BIS-11, differences were identified between patients diagnosed with EDs and patients without EDs. Regarding STAXI-2, there were no significant differences between the two samples. Comparing patients with psychiatric diagnosis and patients without psychiatric diagnosis, significant differences were found in the results of both BIS-11 and STAXI-2.

Interestingly, only 21.3% of the sample was made up of men. This data is in line with various studies about bariatric surgery and EDs (Arija Val et al. 2022, Cooper et al. 2021, Mahony 2008, Zebi et al. 2023). Reasons for this difference could be found in social stigma concerning obesity, which appears to be greater in women, and in the consequent tendency of women to become help-seekers earlier than men (Ali et al. 2017, Wu 2018).

The absence in study of statistically significant differences between men and women on STAXI-2 and BIS-11 scores could be confirmed by previous literature, showing that overweight/obese women have a tendency to turn feelings of anger inward on to themselves together with impaired interpersonal relationships (Iliceto et al. 2012).

In the study, the BIS-11 scale shows scores at the high limits of mild impulsivity (average of total score = 57.35). This is only partially confirmed by previous literature, where a greater impulsivity emerges in obese patients compared to the general population, but generally, in patients with grade III obesity, scores above 70 are found, thus indicating severe impulsivity (Bénard et al. 2017). It was not possible to compare the general results obtained by STAXI-2 with previous literature since no studies were found in regard.

Comparing patients based on the presence or absence of EDs, subjects who suffered from these conditions showed higher levels of impulsivity in several domains as detected by the BIS-11. Instead, no statistically significative differences emerge comparing patients with/without FEDs. This is in contrast with a study that detected higher levels of anger in women with EDs, who obtained higher mean scores than controls on all STAXI-2 scales, except for anger control (Krug et al. 2008). Several theories suggest that some EDs, such Binge Eating Disorder, are often appearing with negative mood and anger is one specific emotion that might commonly trigger dysfunctional eating behaviors (Schag et al. 2023). However, individuals with EDs may also repress and internalize their anger excessively (Boerhout et al. 2019, Jennings et al. 2021), because they perceive the expression of anger as potentially negative and "dangerous" (Fox 2009). In addition, it should be considered that the studies under consideration, were not conducted only on obese people. This would be another possible reason for the difference in results with our study. In fact, obesity is now considered a condition in its own right with its own psychopathology, so the fact that ours is a sample made up only of obese people could change the results.

The mean BIS-11 total scores in patients with EDs was significantly higher than that found in patients without Eds. This is in line with several studies demonstrating an increased food-related impulsivity in obese subjects with and without BED (Schag et al. 2013, İnce et al. 2021). Moreover, an increased attentional impulsiveness is linked to an hypoactivity in the prefrontal control network, leading to a disregulated food intake (Hege et al. 2015, Dingemans et al. 2017, Leombruni et al. 2007).

Patients with psychiatric comorbidities tend to have higher scores on both the STAXI-2 and the BIS-11 scales. This shows the need for presurgical evaluation in subjects undergoing bariatric surgery, in order to identify these conditions. Furthermore, the fact that patients with a psychiatric diagnosis have significantly higher STAXI-2 values than others could show how the anger component is more connected to psychiatric disorders, e.g., mood or personality disorders, rather than EDs Indeed, several studies connect obesity to psychiatric comorbidities, especially mood disorders, and it is known that psychiatric diagnoses can lead to self- or hetero-aggressive behaviors. For this reason, the risk of suicide and self-harm should be carefully assessed above all in subjects with obesity and psychiatric comorbidities (Lievaart et al. 2016, Lopresti et al. 2013, Wurtman & Wurtman 2018).

This study present limitations. This is a preliminary study, and therefore the number of patients is limited, preventing the possibility of generalizing the results. Moreover, it should be noted that patients undergoing pre-surgery bariatric evaluation tests tend to mask aspects of themselves that they perceive as negative, in order to increase their chances of being approved for the surgery (Bandade & Goethe 2012).

Therefore, further studies should delve deeper into the topic, in order to clarify the role of anger and impulsivity in the genesis of obesity and FEDs.

CONCLUSIONS

Obese subjects undergoing bariatric surgery represent a fragile population that must be carefully evaluated from a psychiatric point of view. Obese patients with FEDs show higher scores on the BIS-11 in several domains compared to subjects without FEDs. Obese patients with a psychiatric diagnosis show higher scores than subjects without a diagnosis on both the STAXI-2 and the BIS-11, and therefore represent subjects who should be carefully followed in the pre- and post-surgical process by mental health specialists. For these reasons it is important to consider trait characteristics such as anger and impulsivity, which could have numerous implications in clinical practice, in the pre-surgical evaluation and in the post-surgical follow up. Psychiatric comorbidities in this population underlie a more severe phenotype that should therefore be carefully evaluated with regard to possible behavioral consequences due to levels of anger and impulsivity

Contribution of individual authors:

Leonardo Zebi, Marta Barbi & Giulia Menculini conceived and designed the study.

Leonardo Zebi, Marta Barbi, Maria Teresa Paganelli, Laura Dalla Ragione & Simone Pampanelli collected the dana.

Leonardo Zebi, Marta Barbi, Debora Toshi & Laura Pastorino administered the tests.

Marta Barbi, Debora Toshi, Laura Pastorino & Giulia Menculini created the original dataset.

Leonardo Zebi & Giulia Menculini performed the statistical analysis.

Leonardo Zebi, Marta Barbi, Debora Toshi, & Laura Pastorino wrote the first draft of the manuscript.

Giulia Menculini, Veronica Raspa, Maria Teresa Paganelli, Laura Dalla Ragione, Simone Pampanelli & Patrizia Moretti revised the first draft of the manuscript.

Alfonso Tortorella supervised all phases of the study design and writing of the manuscript.

Acknowledgements: *None.*

Conflict of interest: *None to declare.*

References

1. *Ali K, Farrer L, Fassnacht DB, Gulliver A, Bauer S, Griffiths KM: Perceived barriers and facilitators towards help-seeking for eating disorders: A systematic review. Int J Eat Disord 2017; 50:9-21. doi:10.1002/eat.22598. Epub 2016 Aug 16. PMID: 27526643*
2. *Apovian CM: Obesity: definition, comorbidities, causes, and burden. Am J Manag Care 2016; 22(7 Suppl):s176-85*
3. *Arija Val V, Santi Cano MJ, Novalbos Ruiz JP, Canals J, Rodríguez Martín A: Caracterización, epidemiología y tendencias de los trastornos de la conducta alimentaria [Characterization, epidemiology and trends of eating disorders]. Nutr Hosp 2022; 39(Spec No2):8-15. Spanish. doi:10.20960/nh.04173. PMID: 35748385*
4. *Babbs RK, Sun X, Felsted J, Chouinard-Decorte F, Veldhuizen MG, Small DM: Decreased caudate response to milkshake is associated with higher body mass index and greater impulsivity. Physiol Behav 2013; 121:103–111*
5. *Bechara A, Damasio AR, Damasio H, Anderson SW: Insensitivity to future consequences following damage to human prefrontal cortex. Cognition 1994; 50:7-15. doi:10.1016/0010-0277(94)90018-3. PMID: 8039375*
6. *Bechara A, Damasio H, Damasio AR, Lee GP: Different contributions of the human amygdala and ventromedial prefrontal cortex to decision-making. J Neurosci 1999; 19:5473-81. doi:10.1523/JNEUROSCI.19-13-05473.1999. PMID:10377356; PMCID: PMC6782338*
7. *Bénard M, Camilleri GM, Etilé F, Méjean C, Bellisle F, Reach G, Hercberg S, Péneau S: Association between Impulsivity and Weight Status in a General Population. Nutrients 2017; 9:217. doi:10.3390/nu9030217. PMID:28257032; PMCID: PMC5372880*
8. *Bénard M, Bellisle F, Kesse-Guyot E, Julia C, Andreeva VA, Etilé F, Reach G, Dechelotte P, Tavolacci MP, Hercberg S, Péneau S: Impulsivity is associated with food intake, snacking, and eating disorders in a general population. Am J Clin Nutr 2019; 109:117-126*
9. *Berkowitz L, Harmon-Jones E: Toward an understanding of the determinants of anger. Emotion 2004; 4:107-30*
10. *Bibiloni MD, Coll JL, Pich J, Pons A, Tur JA: Body image satisfaction and weight concerns among a Mediterranean adult population. BMC Public Health 2017; 17:39. doi:10.1186/s12889-016-3919-7*
11. *Boerhout C, van Busschbach JT, Voskamp M, Troquete NAC, Swart M, Hoek HW: Aggression regulation in eating disorders: evidence for a brief body and movement-oriented intervention. Tijdschrift voor Psychiatrie 2019; 61:572–81*
12. *Cooper AJ, Gupta SR, Moustafa AF, Chao AM: Sex/Gender Differences in Obesity Prevalence, Comorbidities, and Treatment. Curr Obes Rep 2021; 10:458-466. doi:10.1007/s13679-021-00453-x. Epub 2021 Oct 2. PMID: 34599745*
13. *Cooper PJ, Taylor MJ, Cooper Z, Fairbum CG: The development and validation of the Body Shape Questionnaire. Int J Eat Disord 1987; 6:485–494. 10.1002/1098-108X(198707)6:4<485: AID-EAT2260060405>3.0.CO;2-O*
14. *Da Luz FQ, Hay P, Touyz S, Sainsbury A: Obesity with Comorbid Eating Disorders: Associated Health Risks and Treatment Approaches. Nutrients 2018; 10:829. doi:10.3390/nu10070829. PMID: 29954056; PMCID: PMC6073367*
15. *Dingemans A, Danner U, Parks M: Emotion Regulation in Binge Eating Disorder: A Review. Nutrients 2017; 9:1274*
16. *Fassino S, Leombruni P, Pierò A, Abbate-Daga G, Giacomo Rovera G: Mood, eating attitudes, and anger in obese women with and without Binge Eating Disorder. J Psychosom Res 2003; 54:559-66. doi:10.1016/s0022-3999(02)00462-2. PMID:12781310*
17. *Fassino S, Abbate Daga G, Piero A, Leombruni P, Rovera GG: Anger and personality in eating disorders. J Psychosom Res 2001; 51:757-64*
18. *Fassino S, Abbate Daga G, Piero A, Rovera GG: Dropout from brief psychotherapy in anorexia nervosa. Psychother Psychosom (in press)*
19. *Fava M, Rappe SM, West J, Herzog DB: Anger attacks in eating disorders. Psychiatry Res 1995; 28:205-12*
20. *Favaro A, Santonastaso P: Different types of self-injurious behavior in bulimia nervosa. Comp Psychiatry 1999; 40:57–60*
21. *Filbey FM, Yezhuvath US: A multimodal study of impulsivity and body weight: Integrating behavioral, cognitive, and neuroimaging approaches. Obesity 2017; 25:147–154*
22. *Fox JRE: A qualitative exploration of the perception of emotions in anorexia nervosa: a basic emotion and developmental perspective. Clin Psychol Psychother 2009; 16:276–302. doi:10.1002/cpp.631*
23. *Giel KE, Bulik CM, Fernandez-Aranda F, Hay P, Keski-Rahkonen A, Schag K, Schmidt U, Zipfel S: Binge eating disorder. Nat Rev Dis Primers 2022; 8:16. doi:10.1038/s41572-022-00344-y. PMID:35301358; PMCID: PMC9793802*
24. *Giel KE, Teufel M, Junne F, Zipfel S, Schag K: Food-Related Impulsivity in Obesity and Binge Eating Disorder-A Systematic Update of the Evidence. Nutrient 2017; 9:1170*
25. *Green E, Jacobson A, Haase L, Murphy C: Reduced nucleus accumbens and caudate nucleus activation to a pleasant taste is associated with obesity in older adults. Brain Res 2011; 1386:109-17*
26. *Greeno CG, Marcus MD, Wing RR: Diagnosis of binge eating disorder: discrepancies between a questionnaire and clinical interview. Int J Eat Disord 1995; 17:153-60.*

doi:10.1002/1098-108x(199503)17:2<153::aid-eat2260170208>3.0.co;2-v

27. Güngör BB, Akgül Aİ, Taymur İ, Demirci H, İnel A: Evaluation of Eating Attitudes, Anger and Impulsivity in Atypical and Non-Atypical Depression and Assessment of Comorbidity of Binge Eating. Psychiatr Danub 2020; 32:105-114
28. Heinberg LJ, Lavery ME: Psychosocial Issues After Bariatric Surgery. In: Still CD, Sarwer DB, Blankenship J (eds). The ASMBS Textbook of Bariatric Surgery Volume 2: Integrative Health. Springer, New York, 2014, 43–54
29. Hörz-Sagstetter S, Caligor E, Preti E, Stern BL, De Panfilis C, Clarkin JF: Clinician-Guided Assessment of Personality Using the Structural Interview and the Structured Interview of Personality Organization (STIPO). J Pers Assess 2018; 100:30-42. doi:10.1080/00223891.2017.1298115. Epub 2017 Apr 7. PMID:28388222
30. Iliceto P, Pompili M, Candilera G, Natali MA, Stefani H, Lester D, Serafini G, Girardi P: Gender-related differences concerning anger expression and interpersonal relationships in a sample of overweight/obese subjects. Clin Ter 2012; 163:e279-85
31. İnce B, Schlatter J, Max S, Plewnia C, Zipfel S, Giel KE, Schag K: Can we change binge eating behaviour by interventions addressing food-related impulsivity? A systematic review. J Eat Disord 2021; 9:38. doi:10.1186/s40337-021-00384-x. PMID:33736708; PMCID: PMC7977597
32. Jennings KM, Bodell LP, Crosby RD, Haynos AF, Wildes JE: Mixture modeling to characterize anorexia nervosa: integrating personality and eating disorder psychopathology. J Am Psychiatric Nurses Assoc 2021; 27:231–9. doi:10.1177/1078390319862029
33. Krug I, Bulik CM, Vall-Llovera ON, Granero R, Agüera Z, Villarejo C, Jiménez-Murcia S, Fernández-Aranda F: Anger expression in eating disorders: clinical, psychopathological and personality correlates. Psychiatry Res 2008; 161:195-205
34. Leombruni P, Pierò A, Dosio D, Novelli A, Abbate-Daga G, Morino M, Toppino M, Fassino S: Psychological predictors of outcome in vertical banded gastroplasty: a 6 months prospective pilot study. Obes Surg 2007; 17:941-8. doi:10.1007/s11695-007-9173-4. PMID:17894155
35. Lievaart M, Franken IH, Hovens JE: Anger Assessment in Clinical and Nonclinical Populations: Further Validation of the State-Trait Anger Expression Inventory-2. J Clin Psychol 2016; 72:263-78
36. Liu X, Turel O, Xiao Z, He J, He Q: Impulsivity and neural mechanisms that mediate preference for immediate food rewards in people with vs without excess weight. Appetite 2022; 169:105798. doi:10.1016/j.appet.2021.105798. Epub 2021 Nov 11. PMID:34774966
37. Lopresti AL, Drummond PD: Obesity and psychiatric disorders: commonalities in dysregulated biological pathways and their implications for treatment. Prog Neuropsychopharmacol Biol Psychiatry 2013; 45:92-9
38. Mahony D: Psychological gender differences in bariatric surgery candidates. Obes Surg 2008; 18:607-10. doi:10.1007/s11695-007-9245-5. PMID:18368463
39. Mole TB, Irvine MA, Worbe Y, et al.: Impulsivity in disorders of food and drug misuse. Psychol Med 2015; 45:771–82
40. MT, Moretti P, Tortorella A: Feeding and Eating Disorders in Bariatric Surgery: A Retrospective Study. Psychiatr Danub 2023; 35(Suppl 3):57-61
41. Nederkoorn C, Smulders FT, Havermans RC, Roefs A, Jansen A: Impulsivity in obese women. Appetite 2006; 47:253-6. doi:10.1016/j.appet.2006.05.008. Epub 2006 Jun 19. PMID:16782231
42. Osório FL, Loureiro SR, Hallak JEC, Machado-de-Sousa JP, Ushirohira JM, Baes CVW, Apolinario TD, Donadon MF, Bolsoni LM, Guimarães T, Fracon VS, Silva-Rodrigues APC, Pizeta FA, Souza RM, Sanches RF, Dos Santos RG, Martin-Santos R, Crippa JAS: Clinical validity and intrarater and test-retest reliability of the Structured Clinical Interview for DSM-5 - Clinician Version (SCID-5-CV). Psychiatry Clin Neurosci 2019; 73:754-760. doi:10.1111/pcn.12931. Epub 2019 Oct 14. PMID:31490607
43. Panksepp J: Affective neuroscience, the foundations of human and animal emotions. London: Oxford University Press, 1998; pp. 187–205
44. Bandade Paul S, Goethe Karen B: Psychosocial Evaluation, Preparation, and Follow-up for Bariatric Surgery Patients. Diabetes Spectr 2012; 25:211–216. https://doi.org/10.2337/diaspect.25.4.211
45. Rasmussen EB, Lawyer SR & Reilly W: Percent body fat is related to delay and probability discounting for food in humans. Behavioural processes 2010; 83:23-30
46. Reuter M, Weber B, Fiebach CJ, Elger C, Montag C: The biological basis of anger: associations with the gene coding for DARPP-32 (PPP1R1B) and with amygdala volume. Behav Brain Res 2009; 202:179-83. doi:10.1016/j.bbr.2009.03.032. Epub 2009 Apr 1. PMID:19463699
47. Roberts CA: Physical and Psychological Effects of Bariatric Surgery on Obese Adolescents: A Review. Front Pediatr 2021; 8:591598
48. Sarwer DB, Allison KC, Wadden TA, Ashare R, Spitzer JC, McCuen-Wurst C, LaGrotte C, Williams NN, Edwards M, Tewksbury C, Wu J: Psychopathology, disordered eating, and impulsivity as predictors of outcomes of bariatric surgery. Surg Obes Relat Dis 2019; 15:650-655
49. Schag K, Sandler L, Zipfel S, Derntl B, Giel KE: Inhibitory control towards angry stimuli in patients with binge eating disorder: a pilot study. J Eat Disord 2023; 11:125. doi:10.1186/s40337-023-00848-2. PMID:37525245; PMCID: PMC10388460
50. Schertz M, Adesman AR, Alfieri NE, Bienkowski RS: Predictors of weight loss in children with attention deficit hyperactivity disorder treated with stimulant medication. Pediatrics 1996; 98(4 Pt 1):763-9. PMID:8885958
51. Serier KN, Sebastian RM, Smith JM, Mullins CR, Smith JE: The Bulimia Test-Revised (BULIT-R): Psychometric properties in a non-clinical sample of White and Latina college women. Eat Behav 2021; 41:101493
52. Slabá Š, Málková I, Wagenknecht M, Riegel KD, Junek L, Lorencová J, Herlesová J, Ondrová VK, Jep PS: Psychological aspects of obesity. Cas Lek Cesk 2020; 159:118-124. English. PMID:33297686

53. *Spielberger CD: State – Trait Anger Expression Inventory: professional manual. Odessa (FL): Psychological Assessment Resources, 1996*
54. *Stice E, Spoor S, Bohon C, Veldhuizen MG, Small DM: Relation of reward from food intake and anticipated food intake to obesity: a functional magnetic resonance imaging study. J Abnorm Psychol 2008; 117:924-35*
55. *Taylor VH, Forhan M, Vigod SN, McIntyre RS, Morrison KM: The impact of obesity on quality of life. Best Pract Res Clin Endocrinol Metab 2013; 27:139-46*
56. *Volkow ND, Baler RD: NOW vs LATER brain circuits: implications for obesity and addiction. Trends Neurosci 2015; 38:345-52. doi:10.1016/j.tins.2015.04.002. Epub 2015 May 7. PMID:25959611*
57. *Volkow ND, Wang GJ, Fowler JS, Telang F: Overlapping neuronal circuits in addiction and obesity: evidence of systems pathology. Philos Trans R Soc Lond B Biol Sci 2008; 363:3191-200. doi:10.1098/rstb.2008.0107. PMID:18640912; PMCID: PMC2607335*
58. *Volkow ND, Wise RA: How can drug addiction help us understand obesity? Nat Neurosci 2005; 8:555-60. doi:10.1038/nn1452. PMID:15856062*
59. *Walenda A, Bogusz K, Kopera M, Jakubczyk A, Wojnar M, Kucharska K: Emotion regulation in binge eating disorder. Psychiatr Pol 2021; 55:1433-1448*
60. *Wu YK, Berry DC: Impact of weight stigma on physiological and psychological health outcomes for overweight and obese adults: A systematic review. J Adv Nurs 2018; 74:1030–1042. doi:10.1111/jan.13511*
61. *Wurtman J, Wurtman R: The Trajectory from Mood to Obesity. Curr Obes Rep 2018; 7:1-5*
62. *Zebi L, Menculini G, Pastorino L, Barbi M, Paganelli MT, Moretti P, Tortorella A: Feeding and Eating Disorders in Bariatric Surgery: A Retrospective Study. Psychiatr Danub 2023; 35(Suppl 3):57-61*

Correspondence:
Patrizia Morettii, MD
Section of Psychiatry, Department of Medicine and Surgery, University of Perugia
Perugia, Italy
E-mail: moretticampi@gmail.com