



Personality type, eating behaviour and suicide risk in women in treatment for obesity

Maria do Desterro de Figueiredo^{1,2} · Stella Nabuco Nasser¹ · Carina Bertoldi Franco³ · Christiane Bischof dos Santos⁴ · Cesar Luiz Boguszewski² · Henrique Lacerda Suplicy² · Adriane Maria Rodrigues² · Rosana Bento Radominski²

Received: 26 November 2019 / Accepted: 13 February 2020 / Published online: 14 March 2020
© Springer Nature Switzerland AG 2020

Abstract

Objectives To determine the personality types of women in treatment for obesity and the associations among their personality characteristics, eating behaviour and suicide risk. **Subjects:** Sixty women in pharmacological treatment for obesity (clinical group: CG) and 60 women post-bariatric gastric bypass surgery (surgical group: SG) were evaluated.

Methods This was an observational and transversal study conducted in a specialized outpatient unit. Personality types were evaluated through the Myers–Briggs Type Indicator (MBTI) test. A semi-structured questionnaire that investigated socio-demographic and lifestyle characteristics was applied, along with the Binge Eating Scale (BES) and the Columbia-Suicide Severity Rating Scale (C-SSRS).

Results Among the 16 possible personality types, the ISFJ (Introversion, Sensing, Feeling, Judging) and ESFJ (Extraversion, Sensing, Feeling, Judging) types were more frequent. In the SG, 32% of the participants presented with the ISFJ type, and 18.3% presented with the ESFJ type. In the CG, 33% presented with the ISFJ type and 25% presented with the ESFJ type. There was a higher prevalence of binge eating behaviour in the CG (Cohen's d : -0.47 ; $p < 0.0001$) and a higher tendency to graze in the SG ($p = 0.005$). Participants with introverted attitudes showed a higher prevalence of severe bingeing (13.3% vs 3.3%, $p = 0.07$), suicidal thoughts throughout life (STTL) (69.5% vs 45.1%, $p = 0.007$), and recent suicidal thoughts (RSTs) (30.4% vs 11.7%, $p = 0.01$) in comparison to extraverted participants. BMI was associated with a higher chance of STTL (37.96 ± 6.41 kg/m² with STTL vs 33.92 ± 4.68 kg/m² without STTL; $p = 0.01$) in the CG compared to the SG. RSTs were associated with BMI in the SG (34.47 ± 3.86 kg/m² with RSTs vs 30.61 ± 5.72 kg/m² without RSTs; $p = 0.01$). In the multivariable analysis, personality type (ISFJ) was an independent predictor of STTL (OR: 3.6; CI 1.3–10.2; $p = 0.01$) and Suicidal Behaviour (SB) (OR: 9.7; CI 2.44–38.9; $p = 0.001$). Conversely, while BMI was an independent factor associated with binge eating, personality type was not.

Conclusions Women who were in pharmacological treatment for obesity or were post-bariatric surgery present specific types of personality. Introversion was associated with a higher BMI and a higher risk of suicidal thoughts.

Level of evidence Level V, cross-sectional descriptive study.

Keywords Personality · Eating behaviour · Suicide · Obesity · Bariatric surgery

This article is part of the Topical Collection on Personality and Eating and Weight Disorders.

✉ Maria do Desterro de Figueiredo
Maria.defigueiredo@fae.edu

¹ Department of Psychology, FAE, University Center of Curitiba, Curitiba, Paraná, Brazil

² Endocrine Division (SEMPR), Clinical Hospital, Federal University of Paraná, Curitiba, Paraná, Brazil

³ Medicine Department, University Center of Maringá, Unicesumar, Maringá, Paraná, Brazil

⁴ Department of Business, FAE, University Center of Curitiba, Curitiba, Paraná, Brazil

Introduction

Obesity is a highly prevalent disease that is associated with physical and psychological comorbidities [1–4]. The World Health Organization defines as overweight as a body mass index (BMI) ≥ 25.0 kg/m² and obesity as a BMI ≥ 30.0 kg/m² [5].

The treatment of obesity is based on lifestyle changes, with restriction of caloric intake, physical activity and behavioural changes, but such approaches often have limited results and are associated with weight regain. In addition to these strategies, pharmacological interventions and bariatric surgery can be employed [6, 7].

Women are considered more likely to have obesity; the prevalence of obesity is 40.4% in women compared to 35.0% in men. Additionally, women have a higher prevalence of severe obesity (BMI ≥ 40.0 kg/m²), and as they get older (between the ages of 40 and 64), obesity prevalence and health related risks increase [1]. Furthermore, obese women present with a lower quality of life, more severe health problems, and chronic diseases, even though obese men have a higher mortality rate. The female population with obesity also suffers greater psychosocial and cultural pressures, which have negative effects on their self-esteem. [2, 3].

There is no agreement in the academic community on the association between personality and obesity. While some clinical studies do not endorse a specific type of personality in the development of obesity [8, 9], others demonstrate strong relations between personality types and obesity [10, 11]. Nevertheless, studies on psychological traits in obese populations can be highly relevant for the clinical management of obese people [12, 13].

The personality typology of the participants was evaluated through the Myers–Briggs Type Indicator (MBTI), which is an inventory that evaluates personality based on the theory of psychological types developed by Carl Gustav Jung. The inventory assesses typology through the combination of 2 attitudes, Extraversion (E) and Introversion (I), and 6 preferences: Sensing (S) vs. Intuition (N), Thinking (T) vs. Feeling (F), and Judging (J) vs. Perceiving (P) [14].

The use of the MBTI is well established in the organizational context [15–18]; however, in the clinical context, it is still scarce [19, 20], even more so in the obese population subjected to weight loss interventions [21, 22].

Eating behaviour is a series of habits, choices, perceptions, and emotional representations involved while eating. Although obesity is not considered an eating disorder, binge eating disorder (BED) is often found in the obese population [12].

A comparative study on the eating behaviours of persons with BED and persons without BED showed that

binge eating episodes in individuals with BED are more significantly related to negative urgency (acting rashly when distressed) or positive urgency (acting impulsively when experiencing positive emotions) compared to binge eating episodes in people without BED [23]. Another study also showed that negative mood, or mood deterioration, can be a crucial antecedent to binge eating episodes for people with BED [24].

In a study comparing how adverse childhood experiences influence people with or without obesity, Silva and Maia [25] stated that the obese population does not experience more adverse experiences, but obese people might show fewer coping strategies and sometimes demonstrate eating as a coping strategy. This understanding is supported by Silva [26], who stated that one in every four obese people describes eating as a coping strategy.

The Swedish Obese Subjects (SOS) study demonstrated that even though bariatric surgery might reduce mortality rates, it could bring adverse effects to the mental health of patients. Suicidal risk and self-aggression rates were more elevated in the surgical group in comparison to the clinical group, indicating the necessity of a psychiatric and psychological evaluation before bariatric surgery and mental health follow-up after [27].

Regarding patients' Suicidal Thoughts Throughout Life (STTL), Musselman et al. [28] showed that patients still had suicidal thoughts independent of their weight loss even 6 months after their surgery. A longitudinal study of 2458 post-bariatric surgery patients demonstrated that one-fourth of the subjects reported a presurgery history of suicidal thoughts or behaviour. The prevalence of self-harm/suicidal ideation was 5.3% presurgery, which decreased to 3.8% at 1 year after surgery and then increased again to 6.6% after 5 years [29].

The goals of the current study were to examine the following: what is the most prevalent personality typology in the women of the study? Is there a difference in the typology of the surgical group and the clinical group? What are the differences in the eating behaviour between these groups of women? What are the differences between STTL, RST and SB rates in the CG and SG? Is there an association among typology, eating behaviour and suicide risk in the women studied?

Subjects and methods

Participants

Women 18–65 years old enrolled in obesity treatment in an endocrine outpatient unit of a general hospital in Curitiba,

Paraná, Brazil, were recruited. This study comprised a surgical group, which included women who underwent bariatric surgery (Roux-en-Y gastric bypass) at least 2 years previously,¹ and a clinical group, which included women in clinical pharmacological treatment (topiramate, sertraline and sibutramine) for obesity. The hospital's Research Ethics Committee approved this study. The study occurred between November 2016 and June 2018.

Procedures

The participants were recruited from the waiting rooms in the hospital. Only women showed interest in participating in the study. Eligible participants signed informed consent documents. They were asked to answer an individual semi-structured interview performed by a psychotherapist. The interviews occurred on the same day as the medical appointments. The questions were about sociodemographic characteristics, self-declared eating behaviours, and habits in general. The participants' typology was evaluated by the Myers–Briggs Type Indicator (MBTI). Eating behaviour was evaluated by the Binge Eating Scale (BES). Suicidal ideation and suicidal behaviour were evaluated by the Columbia-Suicide Severity Rating Scale (C-SSRS). After the interview, the participants were referred to psychotherapeutic groups if they showed any interest. No participant was compensated for their participation in the study.

Instruments

Myers–Briggs type indicator (MBTI)

The MBTI was used for typological evaluation of the participants. The indicator consists of 93 questions with dichotomous answers. Unlike the 8 classical combinations of Jung's typology [30], the MBTI results in 16 possible combinations [31].

Self-reported eating behaviour

The self-reported eating behaviour was evaluated by asking the participants the following questions: Do you consider your eating behaviour as regular or irregular? In which of these profiles of eating would you fit into: night eater, grazer,² or binge eater? Do you hide while eating? Which of these factors might influence your choice for consuming

high calorie foods: emotional factors, hunger, no relation, or other reasons? The participants' answers were recorded.

Binge Eating Scale (BES)

The Binge Eating Scale was used to evaluate the frequency and intensity of binge eating episodes among the participants. This scale consists of a list of 16 items of 3 or 4 affirmatives from which the participant selects the response that best characterizes him or her. Each affirmative corresponds to a point system of 0–3. The final score is the sum of the points in each item. A score lower than 17 points characterizes non-binging behaviour. A score ranging from 18 to 26 points characterizes moderate bingeing. A score of 27 points or higher marks severe bingeing behaviour [33].

Columbia-suicide severity rating scale (C-SSRS)

The C-SSRS is a questionnaire to assess suicidal ideation and behaviour [34]. The subjects' scores were divided into three categories: suicidal thoughts throughout life (STTL), recent suicidal thoughts (RST) and suicidal behaviour (SB).

Statistical analysis

The data were registered in an elaborate electronic data research protocol for Microsoft Office Excel[®] and exported for statistical review using R software [35].

The central tendency measures considered in the statistical analysis were the mean and the standard deviation (SD) for the continuous quantitative variables with normal distributions. Categorical variables were expressed as a percentage of their frequency. The estimation of the difference between two means was performed by the parametric Student's *t* test. The estimation of the difference between the categorical variables was performed by Pearson's Chi-squared test and Fisher's exact tests [36].

The adherence test, which follows a Chi-square distribution to evaluate the most frequent typological profiles obtained through the MBTI, was performed [37]. For the associations, the sample was calculated considering a type I error of 5%, a magnitude of effect of 5%, and statistical tests were applied with an estimated minimum test power of 95%. The effect sizes were measured by the calculation of Cohen's *d* and odds ratios [38].

Results

Almost half of the women in the study were married (47%), and 42.5% had completed a high school education. The participants in the clinical group presented with a 14.78% higher mean BMI in comparison to the

¹ This timeframe was chosen looking for participants with more stable weight and measurements.

² "Repetitive eating (more than twice) of small/modest amounts of food in an unplanned manner, with what we characterize as compulsive and noncompulsive subtypes" [32, p 973].

Table 1 Anthropometric measures and sociodemographic characteristics of the study's groups

Anthropometric measures	Surgical group (60) Mean (SD)	Clinical group (60) Mean (SD)	Total (120) Mean (SD)	<i>p</i> value	Test
BMI (kg/m ²)	31.25 (5.62)	36.67 (6.17)	33.96 (6.48)	<0.0001	Mann–Whitney
Weight (kg)	80.3 (15.99)	93.7 (17.02)	87.0 (17.76)	<0.0001	Mann–Whitney
Age (years)	47.7 (9.57)	42.1 (12.66)	44.9 (11.52)	0.0075	Mann–Whitney
Sociodemographic characteristics	Surgical group (60) Frequency (percentage)	Clinical group (60) Frequency (percentage)	Total (120) Frequency (percentage)	<i>p</i> value	Test
Scholarity					
Completed a middle school	18 (30%)	24 (40%)	42 (35%)	0.496	Fisher's exact test
Studied until high school	27 (45%)	24 (40%)	51 (42.5%)		
Undergraduate degree	15 (25%)	12 (20%)	27 (22.5%)		
Psychosocial data					
Married	32 (53.3%)	24 (40%)	56 (46.7%)	0.0001	Fisher's exact test
Divorced	15 (25%)	12 (20%)	17 (14.1%)		
Single	13 (21.7%)	2 (3.3%)	47 (39.2%)		

surgical group (36.67 ± 6.17 kg/m² vs 31.25 ± 5.62 kg/m², Cohen's *d*: -0.46 ; $p < 0.0001$) (Table 1). The mean time after bariatric surgery of the surgical group was 84.19 ± 41.89 months.

Amongst the 16 possible combinations of typological MBTI profiles, the participants of the study presented with only 13. The most frequent ones in both the surgical and clinical groups were ISFJ (Introversion, Sensing, Feeling, Judging) and ESFJ (Extraversion, Sensing, Feeling, Judging), showing a significance of $p < 0.0001$. However, when comparing the frequency of the ISFJ and ESFJ profiles in each of the groups, similar frequencies were present in both groups ($p < 0.7$). Additionally, the typological profile frequencies showed very little difference between the surgical and clinical groups, revealing a significance of $p < 0.9$, indicating no association (Table 2).

Most of the participants self-reported irregular eating behaviours (55.83%), and there was no association between the surgical and clinical groups ($p = 0.7$). The grazing profile was more prevalent in the SG (58.33%), and self-reported binge eating was more prevalent in the CG (56.66%); there was a significant difference between the groups ($p = 0.005$). Regarding the “hiding while eating” data, there was no significant difference between the SG and CG groups, yet 77.5% of the sample reported this behaviour. The most prevalent factors that influenced high caloric food intake were emotional factors in both groups, with a frequency of 56.66% for the clinical group and 43.33% for the surgical group ($p = 0.002$) (Table 3).

Regarding the Binge Eating Scale (BES), the mean score for the clinical group was 18.67 ± 10.50 points. On the other hand, the mean surgical group score was 10.23 ± 8.47 points. The results showed a higher prevalence of severe bingeing

behaviour (16 participants) in the clinical group (Cohen's *d*: -0.47 ; $p < 0.0001$) (Table 4).

The association between the MBTI profiles and the BES scores showed different results in the clinical and surgical groups. Taking the most common typological profiles (ESFJ and ISFJ) into account, the clinical group showed little difference between the profiles ($p = 0.4804$) but showed an overall higher BES mean score in the ISFJ profile (18.6 ± 11.91 points). However, in the surgical group, there was a significant difference between the profiles (Cohen's *d*:

Table 2 Frequency of typological profiles of participants, accordingly to the MBTI

MBTI	Surgical group (60) Frequency (%)	Clinical group (60) Frequency (%)	Total (120) Frequency (%)
ISTJ	4 (6.7%)	2 (3.3%)	6 (5%)
ISTP	3 (5%)	5 (8.3%)	8 (6.7%)
ISFJ	19 (31.6%)	20 (33.3%)	39 (32.5%)
ISFP	6 (10%)	6 (10%)	12 (10%)
INFJ	1 (1.6%)	1 (1.6%)	2 (1.7%)
INFP	1 (1.7%)	1 (1.7%)	2 (1.7%)
ESTJ	4 (6.7%)	1 (1.7%)	5 (4.1%)
ESTP	2 (3.3%)	1 (1.7%)	3 (2.5%)
ESFJ	11 (18.3%)	15 (25%)	26 (21.7%)
ESFP	6 (10%)	6 (10%)	12 (10%)
ENFJ	1 (1.7%)	0 (0%)	1 (0.8%)
ENFP	1 (1.7%)	1 (1.7%)	2 (1.6%)
ENTJ	1 (1.7%)	1 (1.7%)	2 (1.7%)
Total	60 (100%)	60 (100%)	120 (100%)

The *p*-value was calculated with Pearson's Chi-squared test $p < 0.0001$

Table 3 Frequency and percentage of eating behaviour, eating profile, hiding while eating, and factors that influence high caloric food intake in the surgical and clinical groups

	Surgical group (60) Frequency (%)	Clinical group (60) Frequency (%)	Total (120) Frequency (%)	<i>p</i> value	Test
Eating behaviour					
Regular	28 (46.66%)	25 (41.66%)	53 (44.16%)	0.7133	Fisher’s exact test
Irregular	32 (53.33%)	35 (58.33%)	67 (55.83%)		
Eating profile					
Night eating	1 (1.66%)	9 (15%)	10 (8.33%)	0.0005	Fisher’s exact test
Grazing	35 (58.33%)	17 (28.33%)	52 (43.33%)		
Binge eating	24 (40%)	34 (56.66%)	58 (48.33%)		
Hiding while eating					
Yes	46 (76.66%)	47 (78.33%)	93 (77.5%)	1	Fisher’s exact test
No	14 (23.33%)	13 (21.66%)	27 (22.5%)		
Factors that influence caloric food intake					
Emotional factors	39 (65%)	51 (85%)	90 (75%)	0.0022	Fisher’s exact test
Hunger	7 (11.66%)	8 (13.33%)	15 (12.5%)		
No relation	8 (13.33%)	0 (0%)	8 (6.66%)		
Other	6 (10%)	1 (1.66%)	7 (5.83%)		

Table 4 Frequency of participants in each category of best results in the clinical and surgical groups

	Clinical group (60) Number of participants (%)	Surgical group (60) Number of participants (%)	Total (120) Number of participants (%)	<i>p</i> value	Test
Non-binging	28 (46.66%)	51 (85%)	79 (65.83%)	0.0001	Mann–Whitney
Moderate binging	16 (26.66%)	5 (8.33%)	21 (17.5%)		
Severe binging	16 (26.66%)	4 (6.66%)	20 (16.66%)		

Table 5 BES results in association with the ISFJ and ESFJ typological profiles

Surgical group		ESFJ (<i>n</i> = 11)		ISFJ (<i>n</i> = 19)	
<i>P</i> value	Test	Mean	SD	Mean	SD
0.0426	Mann–Whitney	6.45	7.65	12.89	9.38
Clinical group		ESFJ (<i>n</i> = 15)		ISFJ (<i>n</i> = 20)	
<i>P</i> value	Test	Mean	SD	Mean	SD
0.4804	<i>t</i> Student	15.93	10.15	18.6	11.91

−0.61; *p* < 0.04), with the ISFJ showing a higher mean score (12.89 ± 9.38 points) (Table 5).

The MBTI attitude (Extraversion and Introversion) that has a higher prevalence of severe binging was Introversion; 13.33% of the participants in the study were introverted and had severe binging behaviour. The percentage of participants with an extraverted attitude that have severe binging behaviour was 3.33% (Pearson’s Chi-squares test *p* = 0.07). It was estimated that the odds of a participant with severe binging having an introverted attitude and not an extraverted attitude was 3.7 times that of a participant with a non-binging profile (Table 6).

Most of the participants in the study showed STTL (59.2%), and 37.5% of them showed SB. In the SG, the participants who showed RSTs also had a higher BMI than the subjects who did not (34.47 ± 3.86 kg/m² vs 30.61 ± 5.72 kg/m²; *p* = 0.01; Cohen’s *d*: −0.705). Similarly, the subjects in the CG that presented with STTL also had a higher BMI than the subjects who did not (37.96 ± 6.41 kg/m² vs 33.92 ± 4.68 kg/m²; *p* = 0.01; Cliff’s delta = −0.415).

The ISFJ-profile subjects showed a higher SB rate (OD: 9.7394, CI 2.44–38.9, *p* = 0.001) and STTL rate (OD: 3.6, CI 1.3–10.2, *p* = 0.01) in comparison to ESFJ-profile subjects. In the multivariable analysis, personality type (ISFJ) was

Table 6 Results of the association of the typological attitudes of the MBTI (introversion and extraversion) and the frequency of participants characterized in each category of BES

	Extraversion (51)	Introversion (69)	Total (120)	<i>p</i> value	Test
Non-binging	38 (74.51%)	41 (59.42%)	79 (65.83%)	0.07	Fisher's exact test
Moderate binging	9 (17.64%)	12 (17.40%)	21 (17.50%)		
Severe binging	4 (7.84%)	16 (23.18%)	20 (16.67%)		

an independent predictor of STTL (OR: 3.6; CI 1.3–10.2; $p=0.01$) and SB (OR: 9.7; CI 2.44–38.9; $p=0.001$).

Regarding MBTI attitudes (Extraversion and Introversion) and suicide risk, the introverted attitude showed a higher prevalence of both STTL (69.5% vs 45.1%, $p=0.007$) and RST (30.4% vs 11.7%, $p=0.01$) in comparison to the extroverted attitude.

Discussion

In this study, only female participants were enrolled in the research, and they were recruited from the same hospital. A both gender, with larger sample and a different location of recruitment study would benefit future work. However, these results suggest that the MBTI personality typology frequency and distributions are similar between the surgical and clinical groups of women in obesity treatment. The groups did differ in BMI and BES results.

It is expected that all MBTI profiles occur at the same frequency; however, we were surprised by a higher prevalence of only two typological profiles, ISFJ and ESFJ, in both groups, in the same way that Zitkus [21] had shown these profiles as the most common profiles in an obese population.

Though these typological profiles seem to be similar, only differing the first letter (I or E) they lead to different dynamic functioning. According to Myers [14], in the ISFJ, the dominant process is Sensing, and the auxiliary process is Feeling. In the ESFJ, the dominant process is Feeling, and the auxiliary process is Sensing. In both typological profiles, there is a predominance of Sensing and Feeling functions, which according to Jung [30], refer to a tendency to adapt to the world by attributing value to things and perceiving things, respectively. It seems likely that these profiles are common in this study population because sensing and feeling dynamically influence eating behaviour, and eating has other meanings besides just meeting physiological needs.

Even though some participants' BES scores were elevated, showing severe binging, we cannot confirm diagnoses of binge eating disorder in these participants because this was a brief study involving only a single appointment, and as Freitas et al. [39] has stated, the BED diagnosis should be confirmed on a clinical level.

Regarding the association between personality typology and eating behaviour, it was noted that there was an important correlation between them. It is not possible to state that the introverted personality is an indicator of binge eating in the sample, but the introverted participants showed a higher prevalence of severe binging behaviour compared to the extroverted participants. In relation to the ISFJ/ESFJ profiles and BES results, the participants in the clinical group showed an overall higher mean BES score in relation to the surgical group. The ISFJ profile showed a higher mean BES score in both groups.

However, the results demonstrated that there was a significant difference between eating behaviour after bariatric surgery. As the data suggest, there seemed to be a change in eating behaviour after bariatric surgery since people in the clinical group presented with both higher BES scores and more frequent self-reported binge eating behaviour. In this group, there was also a higher prevalence of eating because of an emotional factor, confirming what has been said previously by the authors [23–26]. On the other hand, the surgical group had lower BES scores and self-reported a higher frequency of the grazing eating behaviour. The grazing behaviour in the bariatric population was also reported by Conceição et al. [32].

Even though suicidal ideation and behaviour were not evaluated in a prospective way, the results of this study showed an alarming mental health reality amongst an obesity treatment population, as more than 50% of the subjects showed STTL. Additionally, the results corroborate those of Nevious et al. [27], who showed a higher frequency of RST in the SG.

Conclusions

- The association between personality, eating behaviour and suicide risk should be taken into account during the treatment of obesity to find better therapeutic strategies that consider the emotional dynamics, the typological functioning of the individual and the way each person deals with food in the processes of losing weight and maintaining weight loss.
- Bariatric surgery seemed to change eating behaviours and patients in the surgical group presented better BMI and

BES results compared to the clinical group. However, it was evident in the study that bariatric surgery did not seem to change a person's personality.

- Additionally, it was noted that the introverted attitude showed more severe bingeing and a greater STTL and RST.
- BMI was not independently associated with suicidal ideation and behaviour, but was associated with binge eating behaviour.

Limitations

It is perceivable that there is a need for complementary work studying personality, obesity and eating behaviour associations, considering wider samples of both genders and different ages, in order to systematize new treatment proposals.

What is already known on this subject?

Not a lot has been said about the association of personality typology according to MBTI, obesity and suicide. Ziklus' [21] study shows association between weight and MBTI types, and that introverted people present more weight.

What does this study add?

This study brings new reflections about treatment for obesity and bariatric surgery. Through the study of personality types, it is possible to identify the risk of patients that might experience suicidal thoughts or action, and binge eating before or after undergoing the bariatric surgery.

Funding An MBTI distributor in Brazil (Fellipelli) granted the inventories utilized in the study. The study was funded by CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), a Brazilian government institution that aims to invest in academical research.

Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval All participants signed Consent Forms and the Hospital's Ethical Committee (Comitê de Ética Hospital de Clínicas da Universidade Federal do Paraná – CEP/HC/UFPR) accepted this study (Number of acceptance: 59996016.9000.0096).

Informed consent All participants provided informed consent prior to their participation.

References

1. Tauqeer Z, Gomez G, Stanford FC (2018) Obesity in women: insights for the clinician. *J Womens Health* 27(4):444–457. <https://doi.org/10.1089/jwh.2016.6196>
2. Torres KDP, Rosa MLG, Moscovitch SD (2016) Gender and obesity interaction in quality of life in adults assisted by family doctor program in Niterói, Brazil. *Ciência e saúde coletiva* 21(5):1617–1624. <https://doi.org/10.1590/1413-81232015215.10832015>
3. Mannucci E, Petroni ML, Villanova N, Rotella CM, Apolone G (2010) Marchesini G (2010) Clinical and psychological correlates of health-related quality of life in obese patients. *Health Qual Life Outcomes*. 8(90):1–9. <https://doi.org/10.1186/1477-7525-8-90>. Accessed 28 June 2019
4. Pinto TF, De Bruin PFC, De Bruin VMS, Lopes PM, Lemos FN (2017) Obesity, hypersensitivity and sleep quality: the impact of bariatric surgery. *Obes Surg*. 27(7):1775–1779. <https://doi.org/10.1007/s11695-016-2536-y>
5. Finucane MM, Stevens GA, Cowan MJ, Danaei G, Lin JK, Paciorek CJ, Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Body Mass Index) et al (2011) National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants. *Lancet*. 377(9765):557–567. [https://doi.org/10.1016/S0140-6736\(10\)62037-5](https://doi.org/10.1016/S0140-6736(10)62037-5)
6. Suplicy H, Boguszewski CL, dos Santos CM, Figueiredo MD, Cunha DR, Radominski R (2014) A comparative study of five centrally acting drugs on the pharmacological treatment of obesity. *Int J Obes (Lond)*. 38(8):1097–1103. <https://doi.org/10.1038/ijo.2013.225>
7. Bray GA, Macdiarmid J (2000) The epidemic of obesity. *West J Med*. 172(2):78–79. <https://doi.org/10.1136/ewjm.172.2.78>
8. Sobal J, Devine CM (1997) Social aspects of obesity: influences, consequences, assessments and interventions. In: Dalton S (ed) *Overweight and weight management*. Aspen Publishers, Maryland, pp 312–331
9. Myslobodsky M (2003) Gourmand savants and environmental determinants of obesity. *Obes Rev* 4(2):121–128. <https://doi.org/10.1046/j.1467-789x.2003.00098.x>
10. Sutín AR, Ferrucci L, Zonderman AB, Terracciano A (2011) Personality and obesity across the adult lifespan. *J Pers Soc Psychol* 101(3):579–592. <https://doi.org/10.1037/a0024286>, <https://www.apa.org/pubs/journals/releases/psp-101-3-579.pdf>. Accessed 4 Mar 2019
11. De Maria CC, Yaegashi SFR (2016) Os Traços de Personalidade Associados no Desenvolvimento da Obesidade. *Rev Bras De Obes Nutr E Emag* 56(10):74–92. <http://www.rbone.com.br/index.php/rbone/article/view/411>. Accessed 28 June 2019
12. Dobrow IJ, Kamenetz C, Devlin MJ. Aspectos Psiquiátricos da Obesidade. *Rev Bras Psiquiatr* 24(3):63–67. <https://doi.org/10.1590/s1516-44462002000700014>, <http://www.scielo.br/pdf/rbp/v24s3/13975.pdf>. Accessed 4 Mar 2019
13. Kontinen H, Silvertoinen K, Sarlio-Lahteenkolva S, Mannisto S, Haukkala U (2010) Emotional behavior and self-efficacy in physical activity as pathways in the association between depressive symptoms and adiposity indicators. *Am J Clin Nutr* 92(5):1031–1039. <https://doi.org/10.3945/ajcn.2010.29732>, <https://www.ncbi.nlm.nih.gov/pubmed/20861176>. Accessed 4 Mar 2019
14. Myers IB (2011) Introdução à Teoria dos Tipos Psicológicos – Um guia para entender resultados do Myers-Briggs Type Indicator®, 6th edn. Fellipelli, São Paulo, p 54. Accessed 7 Mar 2019
15. Potgieter I, Coetzee M (2013) Employability attributes and personality preferences of postgraduate business management students. *SA J Ind Psychol*. <https://doi.org/10.4102/sajip.v39i1.1064>, <https://sajip.co.za/index.php/sajip/article/view/1064>. Accessed 7 Mar 2019
16. Lifchez SD, Redett RJ (2014) A standardized patient model to teach and evaluate professionalism and communication skills: the effect of personality type on performance. *J Surg Educ* 71(3):297–301. <https://doi.org/10.1016/j.surg.2013.09.010>, <https://doi.org/10.1016/j.surg.2013.09.010>

- [://www.sciencedirect.com/science/article/pii/S1931720413002286?via%3Dihub#!](http://www.sciencedirect.com/science/article/pii/S1931720413002286?via%3Dihub#!). Accessed 7 Mar 2019
17. Walczak S, Borkan GL (2016) Personality type effects on perceptions of online credit card payment services. *J Theor Appl Electron Commer Res* 11(1):67–83. <https://doi.org/10.4067/s0718-18762016000100005>, <https://scielo.conicyt.cl/pdf/jtaer/v11n1/art05.pdf>. Accessed 7 Mar 2019
 18. King DD, Ott-Holland CJ, Ryan AM, Huang JL, Wadlington PL, Elizondo F (2017) Homogeneity of personality in organizations and occupations: considering sources of similarity. *J Bus Psychol* 32(6):641–653. <https://doi.org/10.1007/s10869-016-9459-4>, <https://link.springer.com/article/10.1007/s10869-016-9459-4>. Accessed 7 Mar 2019
 19. Schell RV, Dilorenzo AN, Li HF, Fragneto RY (2012) The type of personality resident in anesthesiology correlates with the teacher evaluation of the performance of residents. *J Clin Anesth* 24(7):566–572. <https://doi.org/10.1016/j.jclinane.2012.04.008>, <https://www.sciencedirect.com/science/article/pii/S0952818012002759>. Accessed 7 Mar 2019
 20. Durão IL, Meirinho MJ, Méxas MP (2018) Inovação em serviços de saúde a partir do Teste Myers-Briggs Type Indicator (MBTI) associado à análise de redes sociais (ARS). *Rev Eletron Comun Inf Inov Saúde* 12(3):277–291. <https://doi.org/10.29397/reciis.v12i3.1368>, <https://www.reciis.icict.fiocruz.br/index.php/reciis/article/view/1368/2224>. Accessed 4 June 2019
 21. Zitkus BS (2011) The relationship among registered nurses' weight status, weight loss regimens, and successful or unsuccessful weight loss. *J Am Assoc Nurs Pract* 23(2):110–116. <https://doi.org/10.1111/j.1745-7599.2010.00583.x>, <http://onlinelibrary.wiley.com/doi/10.1111/j.1745-7599.2010.00583.x/full>. Accessed 4 June 2019
 22. Paula LA, Matos CS, Radominski RB, Figueiredo MD (2018) Avaliação Tipológica E Psicodinâmica de Paciente Pós-bariátrica. *Rev Psico FAE Plur Em Saúd Ment* 6(2):85–96. <https://revistapsicofae.fae.edu/psico/article/view/139>. Accessed 4 June 2019
 23. Kenny TE, Singleton C, Carter JC (2019) An examination of emotion-related facets of impulsivity in binge eating disorder. *Eat Behav* 32(1):74–77. <https://doi.org/10.1016/j.eatbeh.2018.12.006>
 24. Svaldi J, Werlea D, Naumann E, Eichlerb E, Berkingb M (2016) Prospective associations of negative mood and emotion regulation in the occurrence of binge eating in binge eating disorder. *J Psychiatr Res* 115:61–68. <https://doi.org/10.1016/j.jpsychires.2019.05.005>.
 25. Silva SSP da, da Maia AC (2011) Adversidade na infância, características psicológicas e problemas de saúde física: comparação entre obesos e não obesos. *Rev Psiquiatr Clín* 38(5):194–200. <https://doi.org/10.1590/s0101-60832011000500005>. <http://www.scielo.br/pdf/rpc/v38n5/a05v38n5.pdf>. Accessed 28 June 2019
 26. Silva S (2008) Experiências adversas na infância e sintomas físicos e psicopatológicos em sujeitos com obesidade mórbida. In: LEAL, Isabel et al., org.—“Congresso Nacional de Psicologia da Saúde: actas do Congresso, 7, Porto, Portugal, pp 667–670. <http://repositorium.sdum.uminho.pt/handle/1822/7789>. Accessed 28 June 2019
 27. Neovius M, Bruze G, Jacobson P, Sjöholm K, Johansson K, Granath F et al (2018) Risk of suicide and non-fatal self-harm after bariatric surgery: results from two matched cohort studies. *Lancet Diabetes Endocrinol* 6(3):197–207. [https://doi.org/10.1016/s2213-8587\(17\)30437-0](https://doi.org/10.1016/s2213-8587(17)30437-0). [https://www.thelancet.com/journals/landia/article/PIIS2213-8587\(17\)30437-0/fulltext](https://www.thelancet.com/journals/landia/article/PIIS2213-8587(17)30437-0/fulltext). Accessed 28 June 2019
 28. Musselman AD, Shenvi N, Manatunga A, Miller AH, Lin E, Gletsu-Miller N, et al (2019) The effects of roux en y gastric bypass surgery on neurobehavioral symptom domains associated with severe obesity. *Physiol Behav* 204:86–92. <https://doi.org/10.1016/j.physbeh.2019.02.013>. <https://www.sciencedirect.com/science/article/abs/pii/S0031938418309302?via%3Dihub>. Accessed 28 June 2019
 29. Gordon KH, King WC, White GE, Belle SH, Courcoulas AP, Ebel FE et al (2019) A longitudinal examination of suicide-related thoughts and behaviors among bariatric surgery patients. *Surg Obes Relat Dis* 15(2):269–278. <https://doi.org/10.1016/j.soard.2018.12.001>. <https://www.sciencedirect.com/science/article/pii/S1550728918305185>. Accessed 28 June 2019
 30. Jung CG (2011) Tipos Psicológicos (vol. 6). In: Jung CG (ed) *Obras completas de C. G. Jung*, 4th edn. Vozes, Rio de Janeiro
 31. Couto G, Bartholomeu D, Montiel JM (2016) Estrutura interna do Myers Briggs Type Indicator (MBTI): evidência de validade. *Aval Psicol* 15(1):41–48. http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S167704712016000100006x. Accessed 28 June 2019
 32. Conceicao EM, Mitchell JE, Engel SG, Machado PPP, Lancaster K, Wonderlich SA (2014) What is “grazing”? Reviewing its definition, frequency, clinical characteristics, and impact on bariatric surgery outcomes, and proposing a standardized definition (2014) *Surg. Obes Relat Dis* 10(5):973–982. <https://doi.org/10.1016/j.soard.2014.05.002>. Accessed 28 June 2019
 33. Gormally J, Black S, Daston S, Rardin D (1982) The assessment of binge eating severity among obese persons. *Addict Behav* 7(1):47–55. [https://doi.org/10.1016/0306-4603\(82\)90024-7](https://doi.org/10.1016/0306-4603(82)90024-7). Accessed 28 June 2019
 34. Posner K, Brown GK, Stanley B, Brent DA, Yershova KV, Oquendo MA, Currier GW, Melvin GA, Greenhill L, Shen S, Mann JJ (2011) The Columbia-Suicide Severity Rating Scale: initial validity and internal consistency findings from three multisite studies with adolescents and adults. *Am J Psychiatry* 168(12):1266–77. <https://doi.org/10.1176/appi.ajp.2011.1011170>. Accessed 5 June 2019
 35. R Core Team (2018) *A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna. Accessed 5 June 2019
 36. Bisquera R, Sarriera JC, Martínez F (2004) *Introdução À Estatística – Enfoque Informático com o Pacote Estatístico SPSS*. Artmed, Porto Alegre. Accessed 5 June 2019
 37. Bussab WO, Morettin PA (2010) *Estatística básica*, 6th edn. Saraiva, São Paulo. Accessed 5 June 2019
 38. Cohen J (1992) Statistical power analysis. *Curr Dir Psychol Sci* 1(3):98–101. <https://doi.org/10.1111/1467-8721.ep10768783>. Accessed 5 June 2019
 39. Freitas S, Lopes CS, Coutinho W, Appolinario JC (2001) Tradução e adaptação para o português da Escala de Compulsão Alimentar Periódica. *Rev. Bras. Psiquiatr* 23(4):215–220. <https://doi.org/10.1590/s1516-44462001000400008>. Available in: <http://www.scielo.br/pdf/rbp/v23n4/7169.pdf>. Accessed 28 June 2019

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.