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# Personality traits of candidates for surgical treatment of obesity and their impact on long-term postoperative outcomes. A systematic review based on PRISMA protocol

## Cechy osobowości pacjentów kwalifikowanych do chirurgicznego leczenia otyłości i ich wpływ na długoterminowe efekty leczenia. Przegląd systematyczny oparty na protokole PRISMA


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### Abstract

The qualification process for patients seeking bariatric surgery includes various psychological evaluations, one of which is personality assessment. Previous literature reviews have focused mainly on the assessment of personality disorders. However, there remains a persistent need to distinguish between personality traits and to summarise the personality profiles of patients who achieve long-term positive results versus those who do not. In this systematic review, conducted according to the PRISMA guidelines, only personality traits and their long-term effects in the postoperative period were analysed with the use of various assessment methods. A total of 3,631 studies, published between 2018 and 2023, were screened, and 17 were included, reporting the data of 4,888 patients. The results of this systematic review lead to the conclusion that bariatric treatment candidates have higher levels of personality traits that are associated with mental health disorders after surgery, e.g. neuroticism or introversion. The results further indicate that long-term surgical outcomes can be predicted based on personality trait profiles. Specific trait patterns were identified that were linked to poorer surgical outcomes. However, the review illustrates that researchers around the world use a variety of methods and theoretical concepts to assess personality traits, making it currently impossible to establish a reproducible pattern of psychological assessment. The authors propose recommendations for psychological assessment in clinical practice.

**Keywords:** personality, %TWL (total weight loss), bariatric surgery, traits

### Streszczenie

Proces kwalifikacji pacjentów zgłaszających się do chirurgicznego leczenia otyłości obejmuje ocenę psychologiczną, w tym ocenę cech osobowości. Dotychczasowe przeglądy literatury skupiały się głównie na ocenie zaburzeń osobowości. Istnieje ciągła potrzeba rozróżniania cech osobowości i poszukiwania profili osobowości pacjentów osiągających długoterminowe pozytywne rezultaty leczenia bariatrycznego oraz identyfikacji takich wzorców cech osobowości, które wiążą się z brakiem dostatecznych efektów pooperacyjnych. W niniejszym przeglądzie systematycznym, przeprowadzonym zgodnie z protokołem PRISMA, za pomocą różnych metod oceny analizowano dane na temat cech osobowości i ich związku z wynikiem chirurgicznego leczenia otyłości. Przeanalizowano łącznie 3631 badań przeprowadzonych w latach 2018–2023. Do przeglądu włączono 17 artykułów, w których przedstawiono dane dotyczące 4888 pacjentów. Wyniki systematycznego przeglądu prowadzą do wniosku, że kandydaci do leczenia bariatrycznego mają wyższy poziom nasilenia cech osobowości, które sprzyjają zaburzeniom zdrowia psychicznego po operacji, np. neurotyczności, introwersji. Wyniki wskazują ponadto, że długoterminowe wyniki leczenia chirurgicznego można przewidzieć na podstawie profili cech osobowości. Zidentyfikowano wzorce cech związanych z brakiem optymalnego wyniku leczenia

chirurgicznego. Przegląd badań pokazuje jednak, że badacze na całym świecie stosują różnorodne metody i koncepcje teoretyczne do oceny cech osobowości, co uniemożliwia obecnie opisanie powtarzalnego wzorca oceny psychologicznej. Autorzy przedstawiają zalecenia dotyczące oceny psychologicznej w praktyce klinicznej.

**Słowa kluczowe:** osobowość, %TWL – % redukcji masy ciała, chirurgia bariatryczna, cechy osobowości

## INTRODUCTION

Obesity rates in the population of adults worldwide are steadily increasing. Bariatric surgery is currently the most sustainable treatment for morbid obesity in patients with a body mass index (BMI) of 40 or higher, who have failed diet therapy, or for those with a BMI between 35 and 40, who also have medical comorbidities (Gloy et al., 2013). Some studies have shown a possible relationship between the outcome of bariatric surgery and psychological factors such as personality characteristics and eating habits (Generali and De Panfilis, 2018). Personality traits can significantly influence lifestyle choices and the maintenance of unhealthy behaviours. Searching for specific personality trait profiles is particularly important for applying appropriate psychological interventions before bariatric surgery (Bordignon et al., 2017). Personality inventories serve not only as a method of identifying limitations, but also as a method of positive diagnosis, focused primarily on identifying those resources which may enhance the process of preparation, treatment, and recovery, and long-term results (Hengartner et al., 2016). However, data on this topic remains insufficient, especially in the context of treatment outcomes. Clinicians have confirmed that low levels of conscientiousness or high impulsivity can negatively impact the results (Yeo et al., 2021). While previous reviews of the literature have explored various psychological factors, few have focused specifically on impulsivity and its impact on weight loss after bariatric surgery (Yeo et al., 2021), and others have looked for direct connections between temperamental features and post-surgery results (Claes and Müller, 2015). Personality traits have also been widely discussed in terms of predicting psychopathological problems, including the development of food addiction (Florio et al., 2022). Taking into the consideration the perspectives mentioned above, there is a clear need for a review of up-to-date original scientific papers focused only on personality traits and their impact on postoperative results. The aim of this review is to summarise the literature on personality assessment in bariatric surgery candidates and patients to classify them by the methods of personality assessment, specific traits, and their ability to predict long-term treatment effects.

## MATERIALS AND METHODS

The systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and

Meta-Analyses PRISMA statement (Page et al., 2021). The review was not registered in any protocol, including PROSPERO.

## Literature search and inclusion

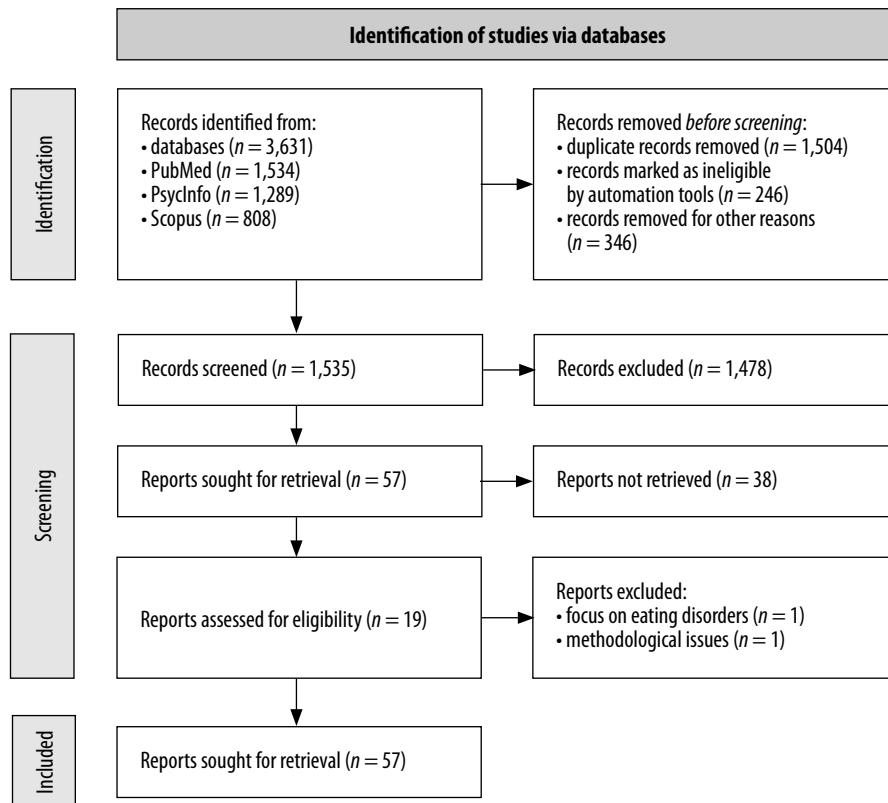
A bibliographic search was conducted by researchers (AKĆ, JK) using the following electronic databases: PubMed (Medline), Scopus, and PsycInfo, covering the period from 12 February 2023 to 5 August 2023. The following index terms, keywords, and synonyms were employed and combined using Boolean logics: [“Personality” OR “Personality traits” OR “Personality profiles”] AND [“Bariatric surgery assessment” OR “Bariatric surgery candidates”] AND “Morbid obesity”. All studies published in English were reviewed. The full selection process is presented in Fig. 1. Two authors (AKĆ and JK) systematically and independently reviewed each article by title and abstract to assess potential eligibility for inclusion in this systematic review. The final decision on inclusion in the study was based on full-text assessment. In case of disagreement, the article was discussed with a third reviewer (BBK) to reach a consensus.

Included were all full-text articles based on original studies assessing specific personality traits of patients undergoing bariatric surgery (laparoscopic Roux-en-Y gastric bypass – LRYGB or laparoscopic sleeve gastrectomy – LSG). All studies included in the review reported on the assessment and outcomes of patients aged 18 to 65 years who met the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) criteria for bariatric surgery, with a baseline BMI  $\geq 40$  kg/m<sup>2</sup>, or  $\geq 35$  kg/m<sup>2</sup> with obesity-related medical comorbidities. Data from graphs was not considered. Only studies that matched specific inclusion criteria related to personality traits were included. Therefore, studies focused specifically on personality traits (or temperamental traits due to linguistic differences) were included, while those on personality disorders were excluded (unless they were tested simultaneously in one setting). Studies were excluded if they: a) focused specifically on surgical or dietary aspects of bariatric surgery, b) focused on eating disorders only, c) verified mainly other psychological concepts, for example self-esteem or locus of control, d) assessed personality disorders instead of traits.

## Data extraction and quality assessment

Data was extracted independently by two authors (AKĆ and JK). Any discrepancies were checked by a third author (BBK). The following parameters were extracted: first

**PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only**



From: Page MJ, McKenzie JE, Bossuyt PM et al.: The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021; 372: n71. For more information, visit: <http://www.prisma-statement.org/>

Fig. 1. Flow chart of study selection

author, year of publication, sample size, mean age, mean BMI at baseline, assessment time points (in years), name of the assessment method, outcome variables, and a summary of the main findings.

## RESULTS

The search identified a total of 3,631 studies. After duplicate removal, 1,535 records were screened based on title and abstract, of which 1,478 did not meet the inclusion criteria. Full-text assessment was performed on the remaining 57 studies. A total of 19 studies could be included in the systematic review, but ultimately two studies were excluded for the following reasons: 1) methodological issues identified, 2) main focus on eating disorders rather than personality traits. The study selection process is shown in Fig. 1. Baseline characteristics are listed in Tab. 1. Tab. 2 shows a summary of the results and classification of personality traits assessment methods.

The results of this systematic review will be discussed in three areas:

1. assessing personality in pre-surgery groups;
2. assessing personality in post-surgery groups;
3. follow-up studies.

## Pre-surgery assessment

The review included four studies that assessed personality traits only in the preoperative period. Brunault et al. (2018) focused on the assessment of personality traits associated with the “food addiction” phenotype, finding lower conscientiousness, higher neuroticism, and lower extraversion. They also reported higher impulsivity sub-scores more frequently. Similar findings on the personality traits of bariatric treatment candidates were obtained by Sekuła et al. (2019). Their data indicate that morbidly obese individuals scored high on the neuroticism scale and low on the conscientiousness scale. Federico et al. (2019) explored personological characteristics in individuals with obesity seeking bariatric surgery compared to those with obesity not seeking bariatric surgery and healthy individuals. Bariatric candidates showed a higher reward dependence in relation to healthy individuals. The authors concluded that they exhibited favourable personality traits e.g. a lower degree of anxiety and avoidance of frustration. Riegel et al. (2022) confirmed greater emotional lability, submissiveness, depressiveness, higher levels of reported anxiety, but also difficulties with trust, isolation and avoidance in social relationships in this group of patients, compared to the general US population.

Number	Author	Year of publication	Study subgroup <sup>#</sup>	Sample size	Age [years]	BMI [kg/m <sup>2</sup> ]
1	Brunault et al.	2018	Pre-surgical	188	NR	NR
2	Federico et al.	2019	Pre-surgical	379	$M = 42$	$M = 42.24, SD = 11.5$
3	Sekula et al.	2019	Pre-surgical	34	$M = 41, SD = 10$	$M = 43, SD = 4.7$
4	Riegel et al.	2022	Pre-surgical	272	$M = 48.06, SD = 10.70$	$M = 43.95$
5	Caltabiano	2021	Post-surgery	127	$M = 45$	$M = 34.13, SD = 7.8$
6	Martin-Fernandez et al.	2021b	Post-surgery	161	$M = 51.32, SD = 10.35$	$M = 46.37, SD = 8.18$
7	de Figueiredo et al.	2021	Post-surgery	120	NR	$M = 36.67, SD = 6.17$
8	Stapleton et al.	2020	Post-surgery	366	NR	$M = 39.14, SD = 7.67$
9	Fujii et al.	2023	Follow-up	57	$M = 42$	$M = 43.9$
10	Lavender et al.	2020	Follow-up	107	$M = 46$	$M = 44.3$
11	Balint et al.	2022	Follow-up	17	NR	$M = 50.21$
12	Dasher et al.	2020	Follow-up	127	$M = 45$	NR
13	Hoyt and Walter	2022	Follow-up	194	$M = 40.8, SD = 12.2$	NR
14	Monteleone et al.	2019	Follow-up	185	NR	NR
15	Tayefi et al.	2020	Follow-up	93	$M = 39.2, SD = 11.9$	$M = 44.7, SD = 7.2$
16	Walter et al.	2022	Follow-up	194	NR	NR
17	Oltmanns et al.	2020	Follow-up	2267	48.6 years, $SD = 11.2$	NR

*M* – mean; *NR* – not reported; *SD* – standard deviation.

<sup>#</sup> Subgroups refer to populations who had assessed personality traits: a) preoperatively only, b) postoperatively only, c) at different time points with follow-up time.

Tab. 1. General study characteristics at baseline

Number	Author, year	Assessment method	Assessment times	Main findings
1	Brunault et al., 2018	Big Five Inventory	1 – pre-surgical	Patients with (vs. without) food addiction exhibited lower conscientiousness ( $p = 0.047$ ), higher neuroticism, and lower extraversion ( $p_s < 0.001$ ), but there was no difference in terms of agreeableness ( $p = 0.42$ ) or openness ( $p = 0.16$ ). They were more frequently single ( $p = 0.021$ ) and reported higher levels of alexithymia ( $p_s < 0.001$ ) and higher impulsivity sub-scores ( $p_s < 0.05$ )
2	Federico et al., 2019	Temperament and Character Inventory (TCI)	1 – pre-surgical qualification	In terms of personality, participants with obesity showed higher harm avoidance ( $p < 0.001$ ) and lower self-directedness compared to healthy subjects (HS)
3	Sekula et al., 2019	NEO-FFI personality inventory	1 – pre-surgical qualification	The study showed that patients with morbid obesity significantly differed from healthy individuals and somatic patients as regards the analysed measurements of the Big Five. The traits which were significantly distinctive in morbidly obese patients included lowered conscientiousness and increased neuroticism. The results indicate that the above pattern of personality traits may contribute to the development of excessive body weight
4	Riegel et al., 2022	Personality Inventory for DSM-5 (PID-5) from which Level of Personality Functioning Scale-Self Report (LPFS-SR) and Standardized Assessment of Severity of Personality Disorder (SASPD)	1 – post qualification, but pre-surgery	A vast majority of patients with obesity showed above-average values in most of the PID-5 domains, with moderate ( $>M + 1.5 \times SD$ ) to severe ( $>M + 2.0 \times SD$ ) personality psychopathology within the Detachment and Negative Affectivity domains according to the PID-5
5	Caltabiano, 2021	International Personality Item Pool (IPIP) 50-item measure of the Five-Factor Model	1 – post-surgery	Conscientiousness was negatively associated with BMI. Separate Hierarchical regression analyses found that Emotional stability (Beta = $-0.43, -0.47, -0.36$ ) and Agreeableness (Beta = $0.27, 0.29, 0.25$ ) predicted overall well-being, symptom occurrence, and subjective relevance of distress, respectively
6	Martin-Fernandez et al., 2021b	Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF)	2 – T0: pre-surgical, T1: six years post-surgery	The groups exhibited large differences (i.e. Cohen's $d \geq 0.80$ ) on the following MMPI-2-RF scales: Emotional/Internalising Dysfunction (EID), Dysfunctional Negative Emotions (RC7), and Negative Emotionality/Neuroticism-revised (NEGE-r)
7	de Figueiredo et al., 2021	Personality types were evaluated through the Myers-Briggs Type Indicator (MBTI) test	1 – two years post-surgery	Introversions was associated with higher BMI and an increased risk of suicidal thoughts
8	Stapleton et al., 2020	Big Five Mini-Marker of Personality	1 – one year post-surgery	Extraversion and Agreeableness were significant predictors of emotional eating, which led to higher BMI in the post-surgery group. Surprisingly, contrary to the initial hypothesis, Emotional Stability was also a significant predictor of emotional eating. Avoidant coping was found to be a mediator of two associations of the variables assessed: the one of Extraversion, Emotional Stability and emotional eating (partially) and fully mediated the relationship with Agreeableness. Thus, it was found that personality traits may increase the risk of choosing nonadaptive coping styles among post-bariatric surgery patients

248 Tab. 2. Summary of results and data gathered

Number	Author, year	Assessment method	Assessment times	Main findings
9	Fujii et al., 2023	Neuroticism-Extraversion-Openness Five-Factor Inventory (NEO-FFI)	2 – T0: preoperative, T1: one year post-surgery	Higher NEO-FFI extraversion (E) scores were significantly associated with a better %TWT one year
10	Lavender et al., 2020	UPPS-P Impulsive Behaviour Scale, the Sensitivity to Punishment/Sensitivity to Reward Questionnaire (SPSRQ)	7 – T0: 30 days prior to surgery, T1–T6: annually	Greater total emotion dysregulation and greater total affect intensity were associated with less weight change and more severe eating pathology. This suggests that intense emotions and difficulties in relating/responding to emotions may promote less effective post-surgical behaviours and/or interfere with adaptive adherence to recommendations and guidelines
11	Balint et al., 2022	Minnesota Multiphasic Personality Inventory-2 (MMPI-2)	1 – post-surgery	Greater weight loss is associated with an increased likelihood of depression along with a lesser likelihood of positive emotional experiences; therefore, psychological support during follow-up is necessary to maintain weight loss. As an introverted personality setting is examined with greater weight loss, active psychological intervention is required to include and maintain subjects in therapy after the surgical procedure. Since subjects with a BMI of 35–40 score significantly higher on the Low Positive Emotions (Rc2) scale, the transition from a BMI of >40 towards a BMI of <35 carries the risk of evoking anxiety and fear of the changing body
12	Dasher et al., 2020	Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF)	3 – T0: preoperatively, T1: six months post-surgery, T2: 12 months post-surgery	Traditional MMPI-2-RF scales indicating higher degrees of behavioural dysregulation, poor self-efficacy, and lower social support predict reduced postoperative weight loss
13	Hoyt and Walter, 2022	Personality Assessment Inventory (PAI)	3 – T0: pre, T1: one year post-surgery, T2: 60 months post-surgery	Personality Assessment Inventory scales assessing anxiety-related disorders, mania, and alcohol problems showed a relationship with BMI outcomes over time. Contrary to expectations, moderate elevations in anxiety-related disorders and mania were associated with a greater initial linear trend for BMI decrease, with a steeper slope for weight regain after approximately three years. Patients scoring above the minimum on the alcohol problems scale showed poorer BMI outcomes
14	Monteleone et al., 2019	Temperament and Character Inventory-Revised (TCI-R) questionnaires	2 – T0: pre, T1: nine months post-surgery	Low self-directedness significantly predicted reduced weight loss at the nine-month follow-up
15	Tayefi et al., 2020	Temperament and Character Inventory-Revised (TCI-R) questionnaires	2 – T0: pre, T1: after surgery	Personality characteristics and eating attitudes had no significant relationship with the success of bariatric surgery
16	Walter et al., 2022	Personality Assessment Inventory (PAI) and the Millon Behavioural Medicine Diagnostic (MBMD)	10 – T0: preoperative, T1–T10: 3, 6, 9, 12, 18, 24, 36, 48, 60 month post-surgery	Elevated scales on the PAI included Positive Impression Management, Somatisation, Depression, Dominance, and Warmth
17	Oltmanns et al., 2020	Personality Assessment Inventory (PAI)	10 follow-up points five years after surgery	Results indicate that personality and psychopathology variables predicted less BMI reduction, weight loss, and %EWL five years after surgery, and also affected the trajectories of change in the outcome variables over time. The PAI scales predicted more variance in the five-year BMI outcomes than age and gender. The most robust effects were seen in scales assessing phobias, traumatic stress, identity problems, and negative relationships

Tab. 2. Summary of results and data gathered (cont.)

### Post-surgery assessment

The review included five studies in which the authors assessed personality traits after surgery to examine the associations between personality, weight loss, and obesity-related well-being. Caltabiano (2021) found that women with higher conscientiousness achieved better results of surgical treatment (lower BMI) compared to those with lower conscientiousness. Emotional stability and agreeableness were significant predictors of all three psychological well-being variables measured by the ORWELL-97 Obesity Related Well-Being scale. Women with greater emotional stability (low level of neuroticism) declared better well-being. Women with high scores on the Agreeableness scale were

characterised by worse overall well-being. Higher extraversion as a trait was associated with better well-being in the postoperative period, and higher conscientiousness as a trait was correlated with better overall well-being, fewer symptoms and their lower relevance in the subjective assessment of the female respondents. In the study by de Figueiredo et al. (2021), two groups of sixty women were compared: one treated pharmacologically, the other undergoing gastric bypass surgery. Among the postoperative group, 32% were of the ISFJ type (Introversion, Sensing, Feeling, Judging), while 18.3% were of the ESFJ type (Extraversion, Sensing, Feeling, Judging). Introversion was found to be associated with higher BMI over time of treatment and an increased risk of suicidal thoughts related to morbid obesity.

In multivariable analysis, personality type (ISFJ) was an independent predictor of suicidal thoughts throughout life and Suicidal Behaviour. Stapleton et al. (2020) examined the links between personality traits, styles of coping with obesity as a chronic disease, and outcomes of bariatric treatment. It turned out that such traits as Extraversion and Agreeableness were significant predictors of emotional eating, which led to higher BMI in the post-surgery group. Personality traits were shown to influence the preferred coping style for those who experience continued obesity after bariatric surgery. The study by Balint et al. (2022) concluded that introverted individuals showed an association between weight loss and depressive indices. The authors noted that the transition from a BMI of >40 towards a BMI of <35 carries the risk of evoking anxiety and fear regarding the changing body.

### Follow-up groups

The results of nine follow-up studies included in the systematic review help to understand the impact of bariatric patients' personality traits on long-term treatment outcomes. Results of a seven-year follow-up (Lavender et al., 2020) indicated that greater total emotion dysregulation and greater total affect intensity were associated with less weight change and greater eating pathology. This data suggests that intense emotions and difficulties with relating/responding to emotions may promote less effective post-surgical behaviours and/or interfere with adaptive adherence to recommendations and guidelines. The results reported by Fujii et al. (2023) confirm the higher %TWL (total weight loss) after one year in the group of patients with an improved lifestyle before the procedure. Higher Extraversion scores were significantly associated with better %TWL at one year. Martin-Fernandez et al. (2021a) examined the predictors and incremental contribution of preoperative psychological testing to long-term bariatric surgery outcomes. Scores on preoperative MMPI-2-RF scales measuring Demoralization, Dysfunctional Negative Emotions, Antisocial Behaviors, and Hypomanic Activation were consistent incremental predictors of six-year outcomes, accounting for an additional 3–24% of the variability in postoperative eating behaviours and quality of life (QoL). According to Dasher et al. (2020), at six months, higher scores of externalising, higher insecurity, and social conflict scores were found to be predictors of less percent weight loss. Among predictors of total weight loss at both six- and 12-month follow-up, the following aspects were found to be significant: demoralisation, antisocial behaviour, hypomanic activation, family problems, and timidity. Hoyt and Walter (2022) showed that Personality Assessment Inventory (PAI) scales assessing anxiety-related disorders, mania, and alcohol problems were related to BMI outcomes over time. Contrary to expectations, moderate elevations on anxiety-related disorders and mania scales were associated with a greater initial linear trend for BMI decrease,

with a steeper slope for weight regain after approximately three years. Patients scoring above the minimum on the alcohol problems scale showed poorer BMI outcomes. Monteleone et al. (2019) evaluated the results of 185 bariatric surgery candidates. The only significant predictor of worse weight outcomes was low self-directedness on the Temperament and Character Inventory (TCI). Tayefi et al. (2020) did not find links between personality characteristics or eating attitudes and final bariatric surgery results in a one-year follow up. The efficacy of measuring psychological factors at the preoperative stage was also examined in one of the retrospective studies carried out in a Military Treatment Facility (Walter et al., 2022). A significant positive impact on weight loss was found on the following scales: higher Positive Impression Management, lower Somatic Complaints, lower Depression, lower Dominance, and lower Warmth. According to the results of the Millon Behavioral Medicine Diagnostic (MBMD) scales, lower results of Problematic Compliance, lower Adjustment Difficulties, lower Respectfulness, lower Confidence and lower Sociability scores were found to be significantly related to the overall ability to maintain long-term results. The results reported by Oltmanns et al. (2020) indicate that personality and psychopathology variables predicted less BMI reduction, weight loss, and percentage of excessive weight loss (%EWL) five years after surgery and also affected the trajectories of change in outcome variables over time. Specifically, the effects of anxiety disorders, borderline personality problems, and stress predicted higher BMI and weight scores over five years after bariatric surgery.

### DISCUSSION

The results of this systematic review clearly show that bariatric patients, regardless of the method of measuring personality traits, exhibit an alarming increase in traits associated with greater vulnerability to emotional, behavioural, and personality disorders. The findings lead to the conclusion that bariatric surgery candidates tend to have higher neuroticism and impulsivity, lower self-directedness, lower extraversion, lower conscientiousness, and difficulty completing tasks, as well as higher dependence on reward and a tendency to avoid harm. They are often more submissive and depressive, and report a higher level of anxiety and a tendency to avoid social relationships. These traits can significantly reduce a patient's ability to adapt to changes resulting from bariatric treatment and may promote a deterioration of mental functioning. According to meta-analyses, high intensity of neuroticism and low intensity of conscientiousness differentiate mental disorder syndromes the most, and are also indicative of the presence of personality disorders (Malouff et al., 2005; Saulsman and Page, 2004). For the prevention of mental health disorders in this group, psychological assessment is necessary to identify patients with high levels of the above-mentioned traits, and to introduce appropriate therapeutic interventions. A systematic

review of studies by Cheroutre et al. (2020) confirmed that participation in cognitive-behavioural therapy (CBT) group sessions before and/or after bariatric surgery was associated with improvements in eating behaviour, psychiatric comorbidities, and body weight in 10 of the 11 included studies. Patient participation in the therapeutic programme helps prevent the development of mental disorders, including suicidal thoughts, in the postoperative period. Psychological evaluation after surgery is also required. Mental health screening during follow-up visits makes it possible to diagnose depressive symptoms and suicidal thoughts, and allows for timely referral to specialised mental health treatment. According to Balint et al. (2022), transitioning from a BMI >40 to a BMI <35 carries the risk of developing depressive and anxiety disorders due to changes in body image, which highlights the need for active guidance from medical professionals during this period. The authors noted that this risk was higher in introverted individuals, who experienced greater weight loss after bariatric surgery. Access to psychological assistance for these patients should be provided at every stage of treatment. Moreover, preoperative psychological evaluation can be used to identify predictors of long-term bariatric surgery outcomes. Identification of these risk factors offers important targets for pre- and postoperative clinical interventions aimed at maximising surgical outcomes.

## CONCLUSIONS

This systematic review of studies on the personality traits of bariatric patients concluded that:

- conscientiousness was negatively correlated with surgical treatment outcomes;
- introversion was associated with a higher BMI and an increased risk of suicidal thoughts after surgery;
- Extraversion and Agreeableness were significant predictors of emotional eating, which led to higher BMI in the post-surgery group;
- greater total emotion dysregulation and greater total affect intensity were associated with less weight change and greater eating pathology;
- higher degrees of behavioural dysregulation, poor self-efficacy, and lower social support predicted reduced postoperative weight loss;
- low self-directedness significantly predicted reduced weight loss at the nine-month follow-up;
- identity problems, post-traumatic stress, negative relationships, and high levels of anxiety as traits predicted lower BMI reduction, weight loss, and %EWL five years after surgery;
- higher Conscientiousness was significantly associated with better surgical treatment outcomes;
- higher Extraversion was significantly associated with better %TWL at one year.

These results clearly indicate that the clinical psychological diagnosis of a candidate for bariatric surgery should be supplemented with an assessment of personality traits.

After reviewing the studies, no definitive or dominant approach for the psychological evaluation of candidates for bariatric treatment was found. The analysed studies differ in their theoretical and methodological approaches to assessing personality traits, which makes it difficult to draw firm conclusions. A total of 13 different methods were used to assess personality traits. The analysis of the studies indicated that the authors most commonly used the MMPI-2-RF and the TCI and TCI-Revised (TCI-R) for personality evaluation. Second, personality traits were assessed using methods based on the Big Five Model (NEO-FFI, Big Five Inventory, Big Five Mini-Marker) and PAI. The variety of tools and theoretical frameworks used by researchers makes it impossible to compare the results. This is likely due to a lack of consensus among researchers as to whether any one method of personality assessment can be considered the most effective. In hospital settings, the most popular inventories are the NEO Personality Inventory-Revised (NEO-PI-R) and MMPI-2, but researchers often choose questionnaires with much lower methodological value. In the case of bariatric surgery patients, it is particularly important to use those tools that have been verified in hospital settings to maintain ecological validity. This summary leads to the conclusion that creating a reproducible and effective protocol for the clinical practice of psychologists requires ongoing valuable research into the personality profiles of patients, guided by clinically recommended methods of personality assessment. In our opinion, the NEO-PI-R inventory could serve as an effective method for clinical personality assessment of bariatric surgery candidates. It is based on the five-factor theory of personality, similar to the other scales mentioned in this systematic review but, unlike them, the NEO-PI-R inventory allows for the profiling of personality traits rather than only describing the main five domains (Piedmont, 1998). Ćwięk et al. (2024), using the NEO-PI-R inventory, identified three clusters/profiles of personality traits in candidates for the surgical treatment of obesity. Based on the results of this study, the authors further provided practice advices for the psychological clinical assessment of candidates for bariatric surgery. Proposed scheme for psychological examination of a candidate for bariatric surgery:

1. Every candidate should undergo a clinical psychological diagnostic evaluation before surgery.
2. The clinical psychological diagnosis should include an assessment of personality traits in addition to a mental health evaluation.
3. The personality assessment inventory should primarily focus on dimensions such as neuroticism, extraversion-introversion, agreeableness, impulsivity, and social action traits such as conscientiousness, assertiveness, and self-direction. For this purpose, we recommend assessing personality traits using the NEO-PI-R inventory.
4. It is reasonable to assume that, within the framework of good clinical practice, high values of the neuroticism factor and low values of the conscientiousness factor

are indications for referring a patient for participation in a psychotherapeutic programme aimed at improving emotional self-regulation.

5. High levels of introversion should also attract clinicians' attention, especially if they are associated with difficulties in identifying negative emotions and a tendency to avoid social relationships.
6. Screening assessment of mental status after bariatric surgery should be incorporated into follow-up visits at obesity surgical treatment centres.

### Conflict of interest

The authors do not report any financial or personal connections with other persons or organisations which might negatively affect the content of this publication and/or claim authorship rights to this publication.

### Author contribution

Original concept of study; final approval of manuscript: AKĆ, BBK. Collection, recording and/or compilation of data; writing of manuscript: AKĆ, JK. Analysis and interpretation of data: AKĆ, JK, BBK. Critical review of manuscript: AM, BBK.

### References

- Balint IB, Csaszar F, Orban L et al.: A safety study of laparoscopic single-anastomosis duodeno-ileal bypass with gastric plication (SADI-GP) in the management of morbid obesity. *Langenbecks Arch Surg* 2022; 407: 845–860.
- Bordignon S, Aparicio MJG, Bertoletti J et al.: Personality characteristics and bariatric surgery outcomes: a systematic review. *Trends Psychiatry Psychother* 2017; 39: 124–134.
- Brunault P, Ducluzeau PH, Courtois R et al.: Food addiction is associated with higher neuroticism, lower conscientiousness, higher impulsivity, but lower extraversion in obese patient candidates for bariatric surgery. *Subst Use Misuse* 2018; 53: 1919–1923.
- Caltabiano ML: Personality, weight loss and obesity-related well-being post-bariatric surgery. *Eat Weight Disord* 2021; 27: 199–206.
- Cheroutre C, Guerrien A, Rousseau A: Contributing of cognitive-behavioral therapy in the context of bariatric surgery: a review of the literature. *Obes Surg* 2020; 30: 3154–3166.
- Claes L, Müller A: Temperament and personality in bariatric surgery – resisting temptations? *Eur Eat Disord Rev* 2015; 23: 435–441.
- Ćwięk A, Kowalska J, Izydorczyk B et al.: Personality profiles of candidate patients for surgical treatment of obesity in the context of recommendations for psychological interventions in the pre- and post-operative periods. *Health Psychology Report* 2024. DOI: 10.5114/hpr/181510.
- Dasher NA, Sylvia A, Votruba KL: Internalizing, externalizing, and interpersonal components of the MMPI-2-RF in predicting weight change after bariatric surgery. *Obes Surg* 2020; 30: 127–138.
- Federico A, Spalatro AV, Giorgio I: Personality and psychopathology differences between bariatric surgery candidates, subjects with obesity not seeking surgery management, and healthy subjects. *Eat Weight Disord* 2019; 24: 623–631.
- de Figueiredo MDD, Nasser SN, Franco CB et al.: Personality type, eating behaviour and suicide risk in women in treatment for obesity. *Eat Weight Disord* 2021; 26: 547–554.
- Florio L, Lassi DLS, de Azevedo-Marques Perico C et al.: Food addiction: a comprehensive review. *J Nerv Ment Dis* 2022; 210: 874–879.
- Fujii A, Inoue K, Kimura H et al.: Personality traits and preoperative lifestyle improvement are predictors of early weight loss after sleeve gastrectomy. *Surg Today* 2023; 53: 882–889.
- Generali I, De Panfilis C: Personality traits and weight loss surgery outcome. *Curr Obes Rep* 2018; 7: 227–234.
- Gloy VL, Briel M, Bhatt DL et al.: Bariatric surgery versus non-surgical treatment for obesity: a systematic review and meta-analysis of randomised controlled trials. *BMJ* 2013; 347: f5934.
- Hengartner MP, Ajdacic-Gross V, Wyss C et al.: Relationship between personality and psychopathology in a longitudinal community study: a test of the predisposition model. *Psychol Med* 2016; 46: 1693–1705.
- Hoyt T, Walter FA: The relationship of presurgical Personality Assessment Inventory scales to BMI following bariatric surgery. *Health Psychol* 2022; 41: 184–192.
- Lavender JM, King WC, Kalarchian MA et al.: Examining emotion-, personality-, and reward-related dispositional tendencies in relation to eating pathology and weight change over seven years in the Longitudinal Assessment of Bariatric Surgery (LABS) study. *J Psychiatr Res* 2020; 120: 124–130.
- Malouff JM, Thorsteinsson EB, Schutte NS: The relationship between the five-factor model of personality and symptoms of clinical disorders: a meta-analysis. *J Psychopathol Behav Assess* 2005; 27: 101–114.
- Martin-Fernandez KW, Marek RJ, Heinberg LJ et al.: Six-year bariatric surgery outcomes: the predictive and incremental validity of presurgical psychological testing. *Surg Obes Relat Dis* 2021a; 17: 1008–1016.
- Martin-Fernandez KW, Martin-Fernandez J, Marek RJ et al.: Associations among psychopathology and eating disorder symptoms and behaviors in post-bariatric surgery patients. *Eat Weight Disord* 2021b; 26: 2545–2553.
- Monteleone AM, Cascino G, Solmi M et al.: A network analysis of psychological, personality and eating characteristics of people seeking bariatric surgery: identification of key variables and their prognostic value. *J Psychosom Res* 2019; 120: 81–89.
- Oltmanns JR, Rivera Rivera J, Cole J et al.: Personality psychopathology: Longitudinal prediction of change in body mass index and weight post-bariatric surgery. *Health Psychol* 2020; 39: 245–254.
- Page MJ, McKenzie JE, Bossuyt PM et al.: The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021; 372: n71.
- Piedmont RL: *The Revised NEO Personality Inventory: Clinical and Research Applications*. Springer Science+Business Media, New York 1998.
- Riegel KD, Konecna J, Matoulek M et al.: Implementation of the DSM-5 and ICD-11 dimensional models of maladaptive personality traits into pre-bariatric assessment. *Front Psychol* 2022; 12: 814421.
- Saulsman LM, Page AC: The five-factor model and personality disorder empirical literature: a meta-analytic review. *Clin Psychol Rev* 2004; 23: 1055–1085.
- Sekula M, Boniecka I, Paśnik K: Bulimia nervosa in obese patients qualified for bariatric surgery – clinical picture, background and treatment. *Wideochir Inne Tech Maloinwazyjne* 2019; 14: 408–414.
- Stapleton P, Spinks T, Carter B: Psychological determinants of continued obesity one-year postbariatric surgery. *Psychol Rep* 2020; 123: 1044–1063.
- Tayefi A, Pazouki A, Alavi K et al.: Relationship of personality characteristics and eating attitude with the success of bariatric surgery. *Med J Islam Repub Iran* 2020; 34: 89.
- Walter FA, Hoyt T, Martinez H et al.: Preoperative psychological assessment and weight loss outcomes in bariatric surgery patients at a military treatment facility: a retrospective profile analysis. *Mil Med* 2022; 187: e1169–e1175.
- Yeo D, Toh A, Yeo C et al.: The impact of impulsivity on weight loss after bariatric surgery: a systematic review. *Eat Weight Disord* 2021; 26: 425–438.