

Personality variables in people with obesity

Wymiary osobowości u osób z otyłością

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Abstract

Obesity remains one of the leading preventable causes of death worldwide. Its prevalence accelerates and exhibits a trend to increase more rapidly than overweight. Obesity is linked to diabetes, heart and vascular diseases, most cancers and a greater chronic and infectious disease burden. Risk factors for obesity are varied, with genetic background, physical activity, sleep quantity and quality, diet, and sociological, economic, environmental aspects among the most frequently mentioned. Psychological factors, especially those related to personality, also remain an important cause underlying the development and persistence of obesity. In this review of studies, significant differences in the intensity of personality dimensions were observed between obese and non-obese people, especially in the level of neuroticism, conscientiousness, extraversion, and openness to experience. The aim of the review was to discuss the correlations of specific personality traits in patients with obesity. High levels of neuroticism and low levels of conscientiousness are recurring findings across the studies. In this summary, attention is also given to other personality traits. It was noted that extraversion and openness to experience distinguished obese people from the general population, but without a clear positive or negative association – the cited studies show a statistically significant correlation between the levels of body mass index and these two personality dimensions, but the direction of the correlation is not uniform across the studies. Considering the above observations, it is possible that there are important differences in the obese population, as clinical experience shows that the group is homogeneous neither in the areas of physical health nor in the area of styles of coping with stress, which may be significant for determining the association with personal traits. The findings of the review show that the analysis of the relationships between personality traits in obese people can be an important factor in the diagnosis and follow-up of these patients.

Keywords: obesity, overweight, personality, personality traits

Streszczenie

Otyłość pozostaje jedną z głównych, możliwych do uniknięcia przyczyn śmierci na całym świecie. Jej rozpowszechnienie wzrasta i wykazuje tendencję do wzrostu bardziej dynamicznego niż przy nadwadze. Otyłość wiąże się z cukrzycą, chorobami serca i naczyń, większością nowotworów oraz większym obciążeniem chorobami przewlekłymi i zakaźnymi. Ryzyko otyłości jest wieloczynnikowe, najczęściej wymienia się czynniki genetyczne, związane z aktywnością fizyczną, ilością i jakością snu, dietą, czynnikami socjologicznymi, ekonomicznymi, środowiskowymi. Aspekty psychologiczne, zwłaszcza związane z osobowością, również pozostają ważną przyczyną rozwoju i utrzymania otyłości. W niniejszym przeglądzie badań zaobserwowano istotne różnice w nasileniu wymiarów osobowości między osobami z chorobą otyłościową i zdrowymi, zwłaszcza w poziomie neurotyczności, sumienności, ekstrawersji i otwartości na doświadczenia. Celem pracy było omówienie występowania korelacji określonych cech osobowości u pacjentów chorujących na otyłość. Wysoki poziom neurotyczności i niski poziom sumienności to powtarzające się wyniki w badaniach. W niniejszym podsumowaniu zwracamy również uwagę na inne cechy osobowości. Zauważono, że ekstrawersja i otwartość na doświadczenie wyróżnia osoby z chorobą otyłościową z populacji, ale bez wyraźnej pozytywnej lub negatywnej korelacji – cytowane badania wykazują istotną statystycznie korelację między poziomami wskaźnika masy ciała a tymi wymiarami osobowości, ale kierunek korelacji nie jest jednolity dla wszystkich badań. Powyższe obserwacje wskazują, że możliwe jest występowanie różnic w grupie osób chorujących na otyłość – z doświadczenia klinicznego wynika, że grupa osób z chorobą otyłościową nie jest jednorodna pod względem zdrowia fizycznego oraz stylów radzenia sobie ze stresem, co może mieć istotne znaczenie w analizach powiązań z cechami osobowymi. Niniejszy przegląd pokazuje, że analiza zależności między cechami osobowości osób z chorobą otyłościową może być ważnym elementem w diagnostyce i obserwacji tych pacjentów.

Słowa kluczowe: otyłość, nadwaga, osobowość, wymiary osobowości

INTRODUCTION

The prevalence of obesity and overweight accelerates (Blüher, 2019; Inoue et al., 2018; Stevens et al., 2012) and the conditions now affect over a third of the world's population (Hruby and Hu, 2015). Extreme obesity (class 3, body mass index, BMI ≥ 40 kg/m²), applies to over 7% of the US population (Ogden and Carroll, 2016), and exhibits a more rapid growth trend than overweight (Hruby and Hu, 2015). Obesity is associated with large decreases in life expectancy and increases in early mortality (Majer et al., 2011; Peeters et al., 2003; St-Onge and Heymsfield, 2003), and is known to be linked to diabetes (Abdullah et al., 2010; Bell et al., 2014; Hosseinpanah et al., 2007; La Vecchia et al., 2011), heart and vascular diseases [Baker et al., 2007; Flint et al., 2010; Global Burden of Metabolic Risk Factors for Chronic Diseases Collaboration (BMI Mediated Effects) et al., 2014; Juonala et al., 2011; Mongraw-Chaffin et al., 2015; Silventoinen et al., 2012), most cancers (Calle and Thun, 2004; Ceschi et al., 2007; Polednak, 2008; Vainio et al., 2002) and a greater chronic and infectious disease burden (Anstey et al., 2011; Huttunen and Syrjänen, 2013; Liu et al., 2013b). Additionally, the lockdowns, self-isolation and stress associated with the pandemic of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) may result in rapid weight gain (Abbas and Kamel, 2020; Mattioli et al., 2020; Mediouni et al., 2020) – a phenomenon which some researchers have termed “covibesity” (Khan and Moverley Smith, 2020).

Risk factors for obesity are varied, with the most frequently mentioned elements being genetic background (Liu et al., 2013a; Speliotes et al., 2010), physical activity, sleep quantity and quality (Beccuti and Pannain, 2011), other behavioural factors, diet (Hill and Commerford, 1996; Hill et al., 2012), social aspects (Wang and Beydoun, 2007), and environmental factors (Durand et al., 2011; Papas et al., 2007; Sallis et al., 2012), and may be caused by infections (Almgren et al., 2012; Atkinson et al., 2005; Ley et al., 2006). Psychological variables are important, as there is an increased prevalence of obese patients seeking treatment for psychiatric morbidity, most commonly depression (Fitzgibbon et al., 1993). There is no consensus about the factors related to personality, although there is evidence that the level of personal traits might correlate with obesity. The review of research and knowledge on the correlations of personality dimensions and overweight and obesity presented in this article may be useful for specialists in their clinical work as well as in the procedure of eligibility assessment for bariatric surgery.

METHODOLOGY

Conclusions from the research studies presented in this review were identified and selected using the PubMed/Medline database and references from relevant articles. The keywords used in the database search included “obesity”;

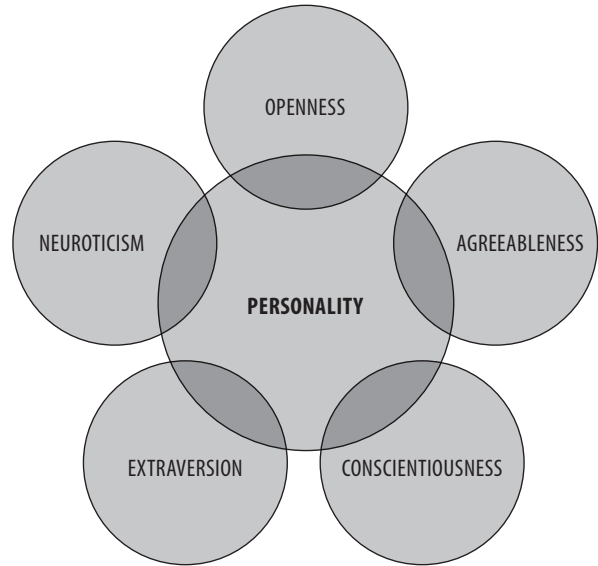


Fig. 1. Five-factor theory of personality identifies five traits: extraversion, agreeableness, openness to experience, conscientiousness, and neuroticism

“morbid obesity”, “personal traits”, and derived phrases. Additionally, searches were performed based on investigator names. Selected studies were based on the five-factor theory of personality and research tools related to it, such as NEO questionnaires.

PERSONALITY TRAITS AND OBESITY

Personality traits are among the most basic variables in the description of personality (Goldberg, 1992; McAdams and Pals, 2006). They refer to relatively persistent predispositions to react in a certain way, both in terms of tendencies to manifest certain behaviours and emotional reactions. Most studies on personality traits are based on the five-factor theory of personality (Costa and McCrae, 1992a; McCrae and Costa, 1999; Ostendorf and Angleitner, 1992) which identifies five factors: extraversion, agreeableness, openness to experience, conscientiousness, and neuroticism (Fig. 1).

Researchers use several personality inventories to measure these traits. One of the most popular tools is NEO – Personality Inventory (NEO-PI) with its revised version NEO-PI-R (Costa and McCrae, 1992c) and shortened version NEO-FFI (Costa and McCrae, 1989). All these forms were very carefully developed in psychometric terms, and they are characterised by good measurement parameters. There are also several dozen foreign adaptations.

Most studies investigating the association of obesity and personality traits rely on one of the NEO inventories, including the most popular one, i.e. the NEO-FFI. This inventory consists of 60 items and helps to determine the severity of the main five traits in the five-factor model of personality. The inventory also has its national adaptations, including Polish.

Some studies identify personal traits as a feature that distinguishes obese people from the general population. The association between obesity and high levels of neuroticism is a recurring conclusion across the studies, just like the connection between obesity and low levels of conscientiousness. Some studies show a similar association (high neuroticism and low conscientiousness) with the style of eating and the development of unhealthy dietary habits (Keller and Siegrist, 2015; Tiainen et al., 2013). However, there is no consensus about the role of extraversion, openness to experience, and agreeableness.

Neuroticism

Neuroticism is a personal trait related to mental and physical health (Costa and McCrae, 1992b). It has been indicated that certain disease symptoms and malaise are commonly related to neuroticism, but they do not always signify a mental or psychosomatic disease. It has been found that neurotic people show strong sensitisation tendencies. However, neuroticism is a predictor of an individual's health condition also because it is associated with a range of health attitudes and behaviours, like smoking.

Some studies have demonstrated that neuroticism is positively associated with obesity. One of them is a study on 34 Polish patients with the diagnosis of morbid obesity, who were in the process of eligibility assessment for surgical treatment of obesity, with BMI ranging from 35 to 54 (Sekula et al., 2019). These patients achieved high results on the scale of neuroticism, as measured by the NEO-FFI. The findings are similar to another study, with the study sample comprising a total of 1988 volunteers drawn from the Baltimore Longitudinal Study of Aging, a multidisciplinary study of normal aging administered by the National Institute on Aging (USA) (Sutin et al., 2011). Part of this sample ($n = 335$) consisted of obese ($BMI \geq 30$) people. The authors also reported a significant positive association

between neuroticism and obesity. The same correlation has been reported in another study, performed in Turkey, using the Turkish translation (Karanci et al., 2007) of Eysenck Personality Questionnaire Revised-Abbreviated Form (EPQR-A) (Francis et al., 1992), with a sample of 429 people, but with no statistical significance.

In yet another study, a cross-analysis showed that neuroticism had a significant association with BMI cross-sectional and longitudinal UK Biobank study, which remained significant after further correcting for physical activity, smoking status, and alcohol consumption (Olivo et al., 2019). Lower neuroticism scores were associated with a greater probability of being overweight than lean. However, in this study the findings point towards the role of neuroticism in as a factor contributing to greater weight variability over time rather than to overweight/obesity itself.

These results differ from the findings of another study, with the study sample comprising a total of 5,286 Danish individuals aged 49–63 years from the Copenhagen Ageing and Midlife Biobank (Wimmelmann et al., 2018). This study found no evidence for any associations between neuroticism and obesity in either men or women. The association between neuroticism and obesity did not reach statistical significance also in the study based on data extracted from the German Socio-Economic Panel (Bagnjuk et al., 2019) and the specifically developed short version of common inventories, the BFI-S (Dehne and Schupp, 2007). Also, a Polish study, with a sample of 90 patients with obesity, showed no statistical significances between neuroticism and obesity (Dudek et al., 2015).

A US study with a total of 5,150 participants stratified by age, sex, and ethnicity (Sutin and Terracciano, 2016) found that a high level of neuroticism, measured with the 44-item Big Five Inventory (BFI) (John et al., 2010), was associated with higher BMI and elevated risk for obesity.

Another study (Shim et al., 2014), conducted in Korea, where overweight was identified from BMI 23 and obesity from BMI 25, showed with statistical significance that overweight

Inventory	Association		M (SD)		Significance	Study
NEO-FFI	Positive	Morbid obesity	24.29 (±8.40)		<0.001	Sekula et al., 2019
NEO-PI-R	Positive	Overweight	48.16 (n/d)		<0.05	Sutin et al., 2011
		Obesity	48.78 (n/d)		<0.01	
NEO-FFI	Positive		22.5 (±9.4)		0.39	Wimmelmann et al., 2018
BFI	Positive		2.86 (n/d)		<0.05	Sutin and Terracciano, 2016
BFI-S	Positive		0.99 (n/d)		<0.10	Bagnjuk et al., 2019
EPQR-A	Positive		Class I obesity	2.5 (±1.9)	0.094	Tekin et al., 2020
	Negative		Class II obesity	2.3 (±1.7)		
	Positive		Morbid obesity	3.8 (±1.5)		
NEO-PI-R	Negative	Women	Overweight	50.7 (n/d)	<0.05	Shim et al., 2014
			Obesity	50.8 (n/d)	<0.05	
		Men	Overweight	48.9 (n/d)	No	
			Obesity	48.5 (n/d)	No	

BFI – Big Five Inventory; **BFI-S** – Big Five Inventory-GSOEP; **EPQR-A** – Eysenck Personality Questionnaire Revised-Abbreviated; **NEO-FFI** – NEO Five-Factor Inventory; **NEO-PI-R** – Revised NEO Personality Inventory.

36 Tab. 1. Association between neuroticism and obesity

Inventory	Association		M (SD)	Significance	Study	
NEO-FFI	Negative	Morbid obese	27.88 (±5.60)	<0.001	Sekula et al., 2019	
NEO-PI-R	Positive		52.38 (±0.56)	<0.01	Sutin et al., 2011	
NEO-FFI	Positive		27.4 (±6.5)	0.26	Dudek et al., 2015	
BFI	Negative		3.08 (n/d)	<0.05	Sutin and Terracciano, 2016	
BFI-S	Positive		1.03 (n/d)	<0.001	Bagnjuk et al., 2019	
EPQR-A	Positive	Class I obesity	4.6 (±1.6)	0.157	Tekin et al., 2020	
	Negative	Class II obesity	3.8 (±2.1)			
	Negative	Morbid obesity	4.0 (±1.6)			
NEO-PI-R	Positive	Women	Overweight	60.5 (n/d)	No	Shim et al., 2014
			Obesity	59.5		
	Negative	Men	Overweight	48.9		
			Obesity	48.5		

BFI – Big Five Inventory; **BFI-S** – Big Five Inventory-GSOEP; **EPQR-A** – Eysenck Personality Questionnaire Revised-Abbreviated; **NEO-FFI** – NEO Five-Factor Inventory; **NEO-PI-R** – Revised NEO Personality Inventory.

Tab. 2. Association between extraversion and obesity

and obese women scored a lower level of neuroticism. The direction of the association in the population of men was also negative, but not significant. The study used the Korean short version of the NEO-PI-R. Summarising the above observations, in the majority of presented studies, neuroticism was positively associated with obesity. The few studies that showed the opposite relationship may involve cross-cultural differences, such as the Korean study, and lowered norms for overweight and thickness. Neuroticism was inversely associated with BMI only in women. In this group, the dominant BMI assigned to “obese” people was around 25. Moreover, there are some limitations in this study that need to be considered. The use of the short version of the NEO-PI-R may have imposed some limitations on the interpretation of the impact of individual facets of personality traits. Different results may have been obtained if the original version of the questionnaire had been used (Tab. 1).

Extraversion

Some studies show a positive association between extraversion and obesity. The relationship reached statistical significance in a few papers (Bagnjuk et al., 2019; Sutin et al., 2011). One of the studies (Wimmelmann et al., 2018) found evidence for gender differences, as only obese men had a high level of extraversion (in this study, the scores were analysed as categorical variables: low, medium, high) and obesity for men and women. Another study (Francis et al., 1992) showed a positive direction, though without statistical significance, between extraversion and obesity. One of the above-mentioned studies (Sekula et al., 2019) showed that patients with morbid obesity had a significantly lower level of extraversion than healthy individuals. However, in this study, the data was compared with the results obtained for healthy people by other authors, with other samples. A US study (Sutin and Terracciano, 2016) also found that obesity was associated with a lower level

of extraversion, with extraversion exhibiting a protective effect against higher BMI.

No clear association between extraversion and obesity, without statistical significance, was shown in the mentioned Turkish study (Tekin et al., 2020) in which the participants were divided by the class of obesity.

The study conducted in Korea (Shim et al., 2014) in a group of obese women showed a statistically significant different association concerning neuroticism than other studies, while in terms of extraversion it failed to show clear results. Extraversion is a personal trait which, among others, characterises the quality and quantity of social interactions. The association between extraversion and obesity may be impacted by the style of interacting and manner of building relationships. It varies depending on the nationality, age, sex, social class etc., which could explain the differences in study findings for men and women in the Korean study (Tab. 2).

Conscientiousness

Some of the mentioned studies showed with statistical significance that the level of conscientiousness among obese people was significantly lower than in healthy patients. The finding was confirmed by studies involving people with morbid obesity (Sekula et al., 2019) and obesity (Keller and Siegrist, 2015; Sutin and Terracciano, 2016). Obese people had significantly lower scores of conscientiousness also in another study included in the review (Sutin et al., 2011), which did not confirm this association at a significant level among overweight people.

One of the studies found (Shim et al., 2014) that obese men had a statistically significant lower level of this trait, but another study (Wimmelmann et al., 2018) revealed a different association: obese men showed a statistically significant medium or high level of conscientiousness. In both studies, the associations were not significant for women.

Obesity is a personal trait which characterises the degree of organisation, perseverance and motivation of an individual

Inventory	Association		M (SD)	Significance	Study	
NEO-FFI	Negative	Morbid obesity	29.82 (±6.51)	<0.001	Sekula et al., 2019	
NEO-PI-R	Positive	Overweight	50.40 (n/d)	No	Sutin et al., 2011	
		Obesity	49.34 (n/d)	<0.05		
NEO-FFI	Positive		32.6 (±6.2)	0.72	Dudek et al., 2015	
BFI	Negative		3.72 (n/d)	<0.05	Sutin and Terracciano, 2016	
BFI-S	Negative		0.98 (0.02)	<0.01	Bagnjuk et al., 2019	
NEO-PI-R	Negative	Women	Overweight	61.9	No	Shim et al., 2014
			Obesity	61.8		
	Negative	Men	Overweight	63.4	<0.05	
			Obesity	63.6		

BFI – Big Five Inventory; **BFI-S** – Big Five Inventory-GSOEP; **NEO-FFI** – NEO Five-Factor Inventory; **NEO-PI-R** – Revised NEO Personality Inventory.

Tab. 3. Association between conscientiousness and obesity

in goal-oriented activities. This may explain the negative correlation between conscientiousness and obesity, especially in people following nutrition programs, which are more often women. The gender differences in the discussed studies may impact the frequency of dieting as another factor impacting obesity (Tab. 3).

Openness to experience

Two of the reviewed studies concluded that openness to experience was the sole personal trait that significantly distinguished obese people from the healthy population. In these studies, obese people scored significantly lower in terms of their openness to experience using NEO-FFI (Dudek et al., 2015) or BFI (Sutin and Terracciano, 2016). In one of the studies (Wimmelmann et al., 2018), where the data was analysed as categorical variables (low, medium, high), both men and women showed high levels of openness. The association is statistically significant, but with a gender difference identified in another study (Shim et al., 2014), where obese men were found to be more open to experience than healthy individuals, while women were shown to be less open.

Most of them failed to reach statistical significance (Bagnjuk et al., 2019; Sekula et al., 2019; Sutin et al., 2011), but the study based on the Baltimore Longitudinal Study of Aging data showed a negative association between this trait of personality and overweight.

Openness to experience is a personal trait describing the tendency of an individual to seek and evaluate life experiences, tolerance towards novelty, and cognitive curiosity. It might be concluded that there is a potential relationship between this personality dimension and the tendency to diversify the diet and try various foods.

Agreeableness

Agreeableness is a personal trait related to health (Costa and McCrae, 1992b). However, only one of the cited studies (Shim

et al., 2014) showed a significant association between obesity and agreeableness, with the level of this trait being higher in the group of obese women. Most of the studies (Dudek et al., 2015; Sekula et al., 2019; Sutin and Terracciano, 2016; Sutin et al., 2011) failed to find any significant differences between obese and healthy people, but the study based on the German Socio-Economic Panel data (Bagnjuk et al., 2019) showed a significant negative association between this trait of personality and obesity. Another study (Wimmelmann et al., 2018) shows that women have a medium or high level of agreeableness, but this association is now shown for men.

Agreeableness is a personality dimension that describes the attitudes towards other people. At the cognitive level, agreeableness differentiates the level of trust in others, at the emotional level – sensitivity to other people's affairs, and at the behavioural level – cooperative versus competitive attitude. People with a high degree of agreeableness are sympathetic and willing to help others, and individuals with low agreeableness levels tend to be self-centred and competitive rather than cooperative. Most studies do not show a significant association between obesity and this personal trait, which could be attributed to the low importance of attitudes towards other people and dietary habits.

CONCLUSIONS

High levels of neuroticism and low levels of conscientiousness are among recurring findings across the available studies. This summary pinpoints other personal traits though without any definite conclusion, as extraversion and openness to experience distinguish obese people from the general population, but without a clear positive or negative association. It is possible that there are differences within the group of obese individuals, but there is little research on this subject, especially based on high-quality psychometric tools, such as the NEO, EPQR or BFI questionnaires. Articles selected for this review are based on these tools and, in addition to the high quality of research, this is a reason to study this aspect further.

Clinical experience shows that the obese population is homogeneous neither in the areas of physical health nor in the area of styles of coping with stress, which may be a significant aspect in analyses of associations with personal traits. There are studies that identify stress as a common risk factor for obesity and addiction (Singh et al., 2021; Sinha and Jastreboff, 2013) or report that experiences of stress are associated with higher BMI (Cotter and Kelly, 2018; Klatzkin et al., 2018). Additionally it was observed that the medium-term impact of bariatric surgery might decrease the prevalence of psychiatric diseases (Granel Villach et al., 2019). Associations between personality traits, styles of coping with stress and selected diagnostic indicators describing the general health of people with obesity are worth examining further, as they might help with the interpretation of the lack of conclusion for significant but not homogeneous description of personality.

Exploring relationships between the personality traits and overweight and obesity is important for public health, as the prevalence of obesity and overweight accelerates, and the conditions already affect over a third of the world's population. A complex multifactorial analysis of the causes of overweight and obesity may contribute to the development of more effective treatment modalities. Taking into account the role of psychological interactions and psychotherapy in the treatment of obesity, including bariatric surgery, is important for public health. Other psychological factors that should be studied from this perspective are related to personality disorders and styles of coping with stress. It is worth exploring the correlations between these elements and BMI as well as other clinical data in a group of obese patients, including the risk of sleep apnoea, abnormalities in morphology or breathing disorders.

More and more studies link personality traits to cognitive performance. This factor may play a role in the predisposition to obesity. Despite many reports of an association between personality traits and obesity, the evidence is conflicting. In addition, data are scarce regarding other cognitive domains and studies of overweight people. The above review organises this knowledge and shows which personality traits correlate more commonly with obesity, and which seem to be of major importance.

Many studies have identified a relationship between personality dimensions and obesity. It might be beneficial to study not only the correlation of personality dimensions, but also intercorrelations of scales measuring dimensions in obese and healthy people. An important factor contributing to the development of obesity may also be the very specificity of personality structure.

Conflict of interest

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

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