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ORIGINAL ARTICLE

People behind unhealthy obsession to healthy food: the personality profile of tendency to orthorexia nervosa

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Abstract

Purpose Our aim was to measure the personality profile of people with high orthorexic tendency using an assessment method which is acknowledged in the research of the classical eating disorders (anorexia nervosa, bulimia nervosa) and obsessive–compulsive disorder (OCD).

Methods In our research, 739 participants completed a self-administered, online questionnaire consisting of two measures: Temperament and Character Inventory-56 (TCI-56) and Ortho-11-Hu.

Results The orthorexia nervosa (ON) grouping variable has a significant effect on three factors of TCI: MANOVA revealed higher harm avoidance (F (2, 736) = 19.01, $p < 0.001$, $\eta^2 = 0.05$), lower self-directedness (F (2, 736) = 22.55, $p < 0.001$, $\eta^2 = 0.06$), and higher transcendence (F (2, 736) = 3.05, $p = 0.048$, $\eta^2 = 0.01$) in the higher ON group, compared to the lower ON group, regardless of the effect of the risk groups.

Conclusions According to earlier studies, high harm avoidance and low self-directedness are relevant factors of anorexia nervosa, bulimia nervosa, and OCD, but now it also seems to be an important parameter of orthorexia. Nevertheless, higher transcendence may be a unique feature, which suggests that orthorexia seems to be an independent phenomenon.

Level of evidence V, descriptive cross-sectional study.

Keywords Orthorexia nervosa · Personality · Eating disorders · Temperament

Introduction

There is a growing focus on healthy eating in developed countries. Undoubtedly, the conscious consumption of food has an important role in the prevention and intervention of numerous diseases, and can also increase quality of life. Nevertheless, it is important to highlight that changes people make to reach the "appropriate" diet can cross a line and can affect their health in a negative way. The paradox of healthy eating is called orthorexia nervosa (ON), and was described by Bratman [1]. ON is characterized by an excessive preoccupation with healthy food; orthorexic patients are obsessed with their self-defined eating rules, and they consume only and exclusively what they find to be healthy. The phenomenon usually begins innocently, for example with overcoming a chronic disease or with the intent of improving general health, but later individuals slowly start to change their diet that (otherwise) used to be ordinary in their childhood and in their cultural environment. Orthorexic people spend considerable time on controlling the sources of food, as well as investigating the whole preparation procedure, and they also plan and prepare their meal in a strict order. They feel anxiety and guilt when they cannot eat healthy and intense frustration when something disturbs their eating habits. Furthermore, disgust appears when the food does not meet their standards [1].

Epidemiological data of ON is hardly influenced by the sensitivity and the specificity of the used questionnaire. To the best of our knowledge, there is not any properly controlled psychometric test to measure ON [2]. Most of the studies are based on ORTO-15, which helped to evaluate incidence rates in many different population groups [3].

This article is part of the topical collection on personality and eating and weight disorders.

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Nevertheless, the validity and reliability of this test is questionable [4], particularly since high-frequency rates (around 70–80%) have been published [3, 5, 6], so the cutoff point is suggested (to need) for re-evaluation. A Hungarian study [7] also attempted to revise this previous cutoff point.

Some specific groups, professions, and certain activities have been showed to have an increased risk of ON: athletes [8], doctors [9, 10], dieticians [11–13], performance artists [14], as well as people with former eating disorders [15], special formal eating habits (because of diabetes, lactose intolerance, gluten sensitivity, or vegetarianism) [16, 17], and Ashtanga yoga practitioners [18].

Because of the high actuality of ON, there is an increasing number of scientific publications in this area. Regarding the connection between personality characteristics and ON, surprisingly limited information is available; however, some personality features have been proved to be important factors. According to earlier studies, orthorexic patients can be characterized with perfectionism, anxiousness, avoidant attachment styles, and need for control [19], as well as obsessive compulsive symptoms [20–22] and neuroticism [23]. To date, no study has investigated the personality features of ON yet using Cloninger's Temperament and Character Inventory (TCI), although it was beneficial for understanding the structure of classical eating disorders.

The Temperament and Character Inventory is a widely used questionnaire, because it provides a multidimensional, integrative approach with its seven factors, in two different categories (temperament features and character dimensions) based on a psychobiological theory [23]. The temperament factors are: harm avoidance (characterized by excessive worrying, pessimism, and shyness), novelty seeking (associated with exploratory activity, impulsivity, and avoidance of frustration), reward dependence (tendency to intensively respond to reward), and persistence (persistence in spite of fatigue and frustration). The three character factors are self-directedness (ability to regulate behavior to achieve personal goals), cooperativeness (trait of helpfulness, empathy, and social tolerance), and transcendence (associated with spiritual experiences and transpersonal identification) [24]. High level of harm avoidance and low level of self-directedness seem to be consequent in anorexic and bulimic patients [25–29]. In addition, according to Fassino et al. [28], these personality traits are common in all of the known eating disorders; they also have a role in the manifestation and in the negative prognosis of the eating pathologies, thus they might be described as the basic personality features of the "eating disorder spectrum" [27]. On the other hand, different types and subtypes of the diseases can bear special personality parameters. Novelty seeking seems to be similarly enhanced in all subtypes of bulimia [26–28], which predicts impulsivity and extravagancy, while anorexic patients (especially the restrictive subtype) can rather be characterized with diligence and stability, which is manifested in the high persistence subscale of TCI [24, 27–29].

It is not clear to what extent ON is an eating disorder or a form of obsessive–compulsive disorder, because some features are shared with anorexic and bulimic patients (intense anxiety about food, rigidity, need for control), but other features can be classified as obsessions or compulsions (individuals with higher OCD symptoms had higher ON tendencies) [30]. To decide on this question, measuring the personality dimensions could be beneficial. It is important to emphasize that in OCD, similarly to eating disorders, high levels of harm avoidance and low levels of self-directedness are common traits among patients [31–34]. Nevertheless, some special characteristics can be observed, manifested in low levels of novelty seeking and cooperativeness [31, 32] that predicts narrow-minded thinking, rigidity, strictly planned behavior [35], social intolerance, and lack of interest in others as well as vengeance [36].

Based on previous studies, we assumed (our first hypothesis) that the risk of ON is related to a high level of harm avoidance and a low level of self-directedness compared to a control group, because these features were core elements of classical eating disorders (anorexia nervosa, bulimia nervosa) and OCD too. In addition, we expected a high level of persistence, based on the criteria of ON described by Bratman [1] and the earlier identified perfectionist attitude of high orthorexic tendency [10]. Our second hypothesis assumed that the above-mentioned pattern of temperament and character factors remain valid after controlling for the effect of the risk groups.

Methods

Participants

Respondents were recruited from social media websites: the questionnaire was shared among university groups, and different types of online communities. To increase our effectiveness, we sent our test battery to forums where we were more likely to find people with strict eating habits; so we published our questionnaire on healthy lifestyle, healthy nutrition, and exercise sites. We also asked people who are possible role models for people with healthy lifestyle (Olympic athletes, lifestyle consultants, and fitness coaches) to share our questionnaire on their websites. Thus, 739 subjects (585 women and 154 men) participated in our study. Their age ranged from 18 to 72 years ($M = 29.67$ SD = 10.18). Based on self-reported risk group involvement, participants were: 15.2% doctors ($n = 112$), 11.5% athletes ($n = 85$), and 10.0% dieticians ($n = 74$). Performance artists ($n = 32$, 4.3%), and Ashtanga yoga practitioners ($n = 35$, 4.7%) appeared in relatively small numbers in the sample. Approximately 5.7%

($n=42$) of the subjects had been diagnosed with other eating disorder(s), and about 20% of the sample followed a special form of diet ($n=177$) (because of vegetarianism, diabetes, food allergy, or other reasons).

Measures

We collected information about the subjects' demographic characteristics, which included questions about sex, age, BMI, and the involvement of the risk groups.

To measure the risk of ON, we used the Ortho-11-Hu questionnaire [7], which is the Hungarian version of the original ORTO-15 questionnaire by Donini et al. [3]. The ORTO-15 is based on Bratman's Orthorexia Test (BOT), but it also contains a few obsessive–compulsive personality traits from the Minnesota Multiphasic Personality Inventory (MMPI). ORTO-15 is a self-reported questionnaire: participants have to answer the 15 items on a four-point Likert-scale (1 = always, 2 = often, 3 = sometimes, 4 = never); lower values suggest higher risk of ON. The questions are about selecting, purchasing, and eating healthy food. The Hungarian version is shorter than the original one because confirmatory factor analysis confirmed only 11 appropriate items [7]. The reliability values of Ortho-11-Hu suggest good internal consistency (Cronbach-alfa = 0.82). Varga et al. [7] defined a new, stricter criterion (i.e., scores below 26) for identifying prevalence rates, which seemed to be more effective because the prevalence rates reduced significantly (from 74 to 21%) in their validation study; using this criterion, the prevalence rate in the current study was 16%. We used only the Ortho-11-Hu questionnaire to measure ON, because there are not any other widely used scales to measure eating disorder pathology or general psychopathology in the light of unhealthy ways of healthy eating.

The Temperament and Character Inventory we used was originally developed by Cloninger, based on an integrative psychobiological approach to measure personality dimensions [35]. The first version of the test contained 240 items, but has been revised because of its length. The original factor structure has been constant during the changes. The Hungarian version includes 56 statements and has similarly good psychometric indicators [37], measuring temperament and character dimensions. Temperament is said to be a biological predisposition, which remains relatively stable throughout one's life, as it is genetically determined and cannot be modified by learning processes. Character includes features that are realized through social experiences, introspective thinking, and reconstruction of our self-image [36]. The four temperament factors of the questionnaire are (Cronbach α's are based on the present study's results): novelty seeking ($\alpha=0.64$), harm avoidance ($\alpha=072$), reward dependence ($\alpha=0.63$), and persistence ($\alpha=0.74$). The three character dimensions are: self-directedness ($\alpha=0.72$), cooperativeness ($\alpha=0.73$), and self-transcendence ($\alpha=0.84$). Subjects have to rate the statements on a five-point Likert-scale (1 = definitely false; 5 = definitely true).

Procedure

The present study is a self-reported, cross-sectional research study. The survey was made by the LimeSurvey editor program, and was shared on social media sites and on networks of various thematic groups. To increase the effectiveness of our recruitment, we tried to reach the potentially affected subjects specifically, thus we sent our questionnaire to healthy lifestyle, healthy nutrition and sport communities, to fitness, yoga center sites, and to artist, medical, and dietetics teachers. Before the questions we provided information about the ethical principles, main purpose, and data processing of the research. After accepting ethical conditions, subjects completed the survey anonymously.

Data analyses

The analysis of data was performed by the IBM SPSS statistics 22 software. The Kolmogorov–Smirnov tests' result showed a significant deviation from normality in both of the used questionnaires ($p<0.001$), but we were able to use parametric statistical analysis according to the central limit theorem. To analyze the ON group differences on the demographic variables, Chi-square analysis and independent sample *t*-test were performed; the effect of ON grouping variable on TCI was analyzed by MANOVA.

Results

In interpreting the results, it is important to mention that the Ortho-11-Hu questionnaire uses a reversed scale, so low scores mean high orthorexic tendencies and high scores mean low tendencies. Based on the subjects' Ortho-11-Hu score, we split the sample into three different (low, medium, and high ON tendency), approximately equal groups before analysis, and then compared the low-risk (Ortho-11-Hu range of score from 35 to 43, $n=245$) and the high-risk groups (Ortho-11-Hu range of score from 14 to 29, $n=234$). We did this to avoid a situation where two subjects in different groups are closer to each other than to others in the same group. This procedure was required because the intra-group differences are confounding variables in TCI. We preferred not to work with groups based on cutoff points, because there is no consensus of cutoff points in the literature. Therefore, in this way we worked with low- and high-risk groups and not with diagnostic ON group.

We found significant gender differences in ON tendencies (Pearson χ^2 (1, $n=479$) = 18.47, $p<0.001$ (2-tailed),

$\varphi = 0.19$); with women (54% high ON, 46% low ON) more likely than men (30% high ON, 70% low ON) to be in the high versus low ON tendency group. There were various potential risk groups in our sample according to the literature: particular professions (doctors, dieticians, athletes, performance artists, and Ashtanga yoga practitioners), subjects with a special diet, and subjects with earlier diagnosed eating disorders. Chi-square analyses showed that there were no differences in the six professional groups (the five risk and the non-risk groups) on ON tendencies (Pearson χ^2 (10, $n = 739$) = 11.41, $p = 0.33$ (2-tailed), $\varphi = 0.12$). Regarding the other potential risk groups, the Chi-square test revealed that the special diet group (69% high ON, 31% low ON) is more likely to be in the high versus low ON tendency group than the non-special diet group (42% high ON, 58% low ON) (Pearson χ^2 (1, $n = 479$) = 24.78, $p < 0.001$ (two tailed), $\varphi = 0.23$), that is, subjects with special diet are 3.01 times more likely to be in the high ON tendencies group. Similarly, significant differences have been found between eating disorder and non-eating disorder groups regarding ON tendencies: with the eating disorder group (92% high ON, 8% low ON) more likely to be in the high versus low ON tendency group than the non-eating disorder group (46% high ON, 54% low ON) (Pearson χ^2 (2, $n = 479$) = 35.54, $p < 0.001$ (two tailed), $\varphi = 0.27$). In addition, according to the independent sample t-test, we found significant differences in age between the high ($M = 27.37$, SD = 8.21) and the low ($M = 31.82$, SD = 11.49) ON tendencies groups (t (442.23) = − 4.89, $p < 0.001$ (2-tailed), $r = 0.23$). In line with some previous research, the independent sample t-test did not show any differences in BMI between the high ($M = 23.03$, SD = 4.17) and low ($M = 21.61$, SD = 3.98) ON tendencies groups (t (477) = 1.15, $p < 0.25$ (two tailed), $r = 0.05$).

To test our first hypothesis, MANOVA was used. The method revealed that there are significant differences between the ON groups effect when considered jointly on the temperament and character factors (Wilk's $\Lambda = 0.89$, F (14, 1460) = 5.97, $p < 0.001$, $\eta^2 = 0.05$) (Table 1). According to the MANOVA's between subject effect analysis, there was a significant difference between the ON groups in harm avoidance (F (2, 736) = 16.32, $p < 0.001$, $\eta^2 = 0.04$). The high ON tendency group is associated with higher harm avoidance scores compared to the low ON tendency group. There was also a significant difference between ON groups on self-directedness factor (F (2, 736) = 19.16, $p < 0.001$, $\eta^2 = 0.05$) with the high ON tendency group scoring lower than the low ON tendency group. Finally, ON groups significantly differed in their transcendence scores (F (2, 736) = 3.72, $p = 0.025$, $\eta^2 = 0.01$) with the high ON tendency group tending to have higher scores on the scale than the low ON tendency group. When the MANOVA was conducted the second time, including the special diet and eating disorder grouping variables as covariates, exactly the same pattern of significance was found regarding ON-TCI connections.

Discussion

The present study investigated the personality profile of people with high risk of ON with the help of TCI. The results confirmed that high harm avoidance and low self-directedness are relevant factors in ON as in obsessive–compulsive [31–34] and in anorexic and bulimic diseases [25–29]. High harm avoidance indicates a pessimistic concern about the future along with fear, feeling of insecurity, fatigue, and shyness in front of strangers [36]. Furthermore, low self-directedness is associated with low self-esteem, blaming others, dependency, and uncertainty around identity and goals [36].

Although TCI has never been used in an ON population before, some other personality features have been identified to be relevant characteristics of ON and, thus these parameters can be paralleled with the observed temperament and character factors. Shyness in front of strangers, as seen in high harm avoidance, has been identified as a similar factor—high social anxiety—in an earlier study [38], and, also, fear and feeling of insecurity can be compared with the proven high-anxiety state [39]. Low

Table 1 The results of the MANOVA between ON grouping variable and TCI scales

TCI factors	F values	Mean values		SD		p	η^2
		High ON tendency	Low ON tendency	High ON tendency	Low ON tendency		
Harm avoidance	*16.32*	*18.03*	*15.78*	*4.49*	*4.20*	*< 0.001*	*0.04*
Self-directedness	*19.16*	*39.33*	*42.83*	*6.67*	*6.09*	*< 0.001*	*0.05*
Transcendence	*3.72*	*24.66*	*23.22*	*7.94*	*8.30*	*0.04*	*0.01*
Novelty seeking	0.38	21.72	22.08	4.83	4.46	0.68	0.001
Reward dependence	0.94	27.44	27.27	4.47	4.83	0.39	0.003
Persistence	0.45	17.37	17.08	3.58	3.57	0.64	0.001
Cooperativeness	0.36	30.95	31.27	4.34	4.81	0.69	0.01

The significant ones are italicized and placed at the top

self-esteem, which is a core element of self-directedness, can be paralleled with the lower scores of body dissatisfaction scales as measured by Barnes and Caltabiano [40]. Self-directedness has been described as willpower and the ability to regulate and control the behavior to achieve goals. This is low in case of ON, which is possibly manifested by the strong need for control as stated by Brytek-Matera [30] and Mathieu [41]. Finally, dependent relationships, immature characteristics, and feelings of uncertainty, as measured in low self-directedness, can be compared with ON's obsessive–compulsive traits [20], carefulness [10], anxious attachment style [19], distorted eating attitudes [21] and narcissism [42]. In conclusion, the "orthorexic personality" can be characterized by excessive worrying, along with being fearful and anxious, which is manifested by shyness in social situations, matched with the desire to be perfect and accepted. These mechanisms can be mediated by body dissatisfaction and the rigid internalization of social cultural attitudes toward appearance [38]. Besides, low self-esteem and the feeling of ineffectiveness suggest the inability to handle harmful events, which can be compensated by strictly planned, excessively pure dietary habits, coming from the intense need for control.

High harm avoidance and low self-directedness are described as the basic personality factors of the eating disorder spectrum [27] and of OCD [31], but there are some special characteristics of the different disorders, as shown below (Fig. 1).

The common factors suggest similar background and etiology. The temperamental dimension (harm avoidance) is connected with the predisposition toward a low serotoninergic tone (5-HT dysfunction), which might occur through familial transmission. This is matched by an immature, self-humbling character feature [29]. Low self-directedness scores have been considered a risk factor for being vulnerable to social pressure to be thin and perfect, which can contribute to the development of eating disorders and OCD. It is worth considering that these disorders are developed as a reaction to stressors, because these two dimensions together reduce coping skills to negative life events [28]. It is also possible that the forms of the evolving mental illnesses are mediated by the specific characteristics of the different diseases.

Based on our results, it is difficult to place ON on the eating disorder-OCD spectrum, because no eating disorder-specific (e.g., high perseverance in anorexia nervosa or high novelty seeking in bulimia nervosa) or OCD-specific personality (e.g., low novelty seeking or low cooperativeness) features have been identified.

Anorexia nervosa and ON clearly share some psychopathological features and ON can be described as a restrictive

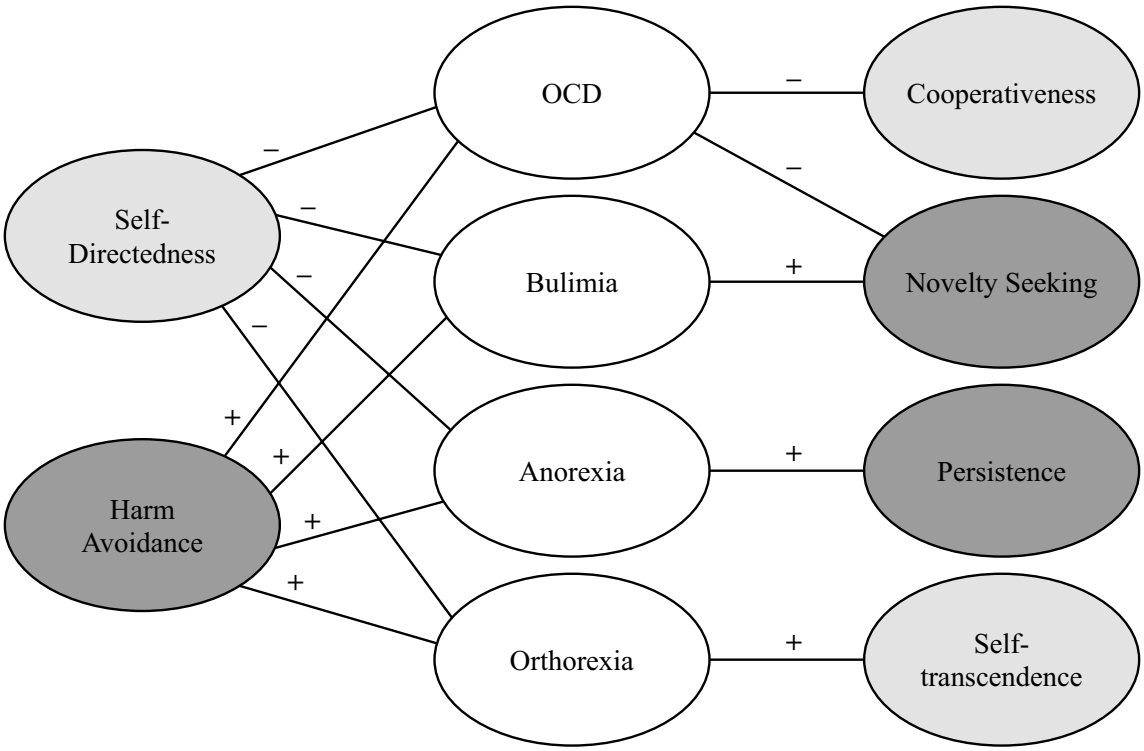

Fig. 1 The relationships between anorexia, bulimia, OCD, orthorexia, and the TCI's different dimensions. Shared and unique positive (+) and negative (−) correlations between the disorders (white) and the character (light gray) and temperament (dark gray) components of the TPI

anorexia nervosa-like disorder with increasing attention toward healthy food. Food-related ruminative thinking represents the cognitive aspects of restrictive eating, which can play an important role in all of the eating disorders [43, 44].

It is important to highlight that, according to recent literature, not only eating disorders and OCD, but also autism spectrum disorder (ASD) should be taken into account in identifying the link between ON and psychopathological processes. Studies suggest that there is a significant overlap between clinical features of anorexia nervosa and some ASD characteristics. Rigid attitudes are core characteristics of anorexia nervosa, and rigid, repetitive behavior can also be detected in ASD. Both disorders have social abnormalities, emotional intelligence deficits, and problems in theory of mind tasks. The ritualized patterns of eating and preparation processes, food selectivity, and the inflexible routines are common in both disorders [45]. It would be beneficial in the future to investigate whether these disorders (ON, AN, BN, OCD, ASD) share similar personality features according to TCI.

The correlation with transcendence (as measured by TCI) and ON, although small in magnitude, seems to be unique to the tendency to ON among the above-mentioned eating disorders. The character factor of spirituality is associated with experiencing a feeling in unity with nature and the universe. Starving abilities, deprivation of food, and extreme fasting are historically associated with spirituality, and the aim of these behaviors was to reach sainthood [45]. The spiritual beliefs are also well-known to be linked to anorexia nervosa, but the purpose is different: seek the thinness to get the ideal body according to Western culture [46].

Based on earlier studies, healthy behaviors can be correlated with transcendence [47–49]. Special forms of nutrition, such as vegetarianism, are often based on spiritual principles [48], and it can be a source of dieting, fasting, or a "detoxification cure" [47]. Surprisingly, spirituality is also associated with a negative body image and rumination [49]. In the context of healthy food addiction, high transcendence is presumably related to self-created pseudo-spiritual theories, which play an important role in supporting the individual's extreme way of life [1]. Therefore, obsessive healthy nutrition is not just a lifestyle, but rather a personal philosophy, by which the orthorexic individual can live in an illusion of safety. This assumption can be paralleled with Bratman's original definition of ON, in which he described affected individuals as people who often try to reduce their disappointment through healthy eating as well as organizing specific spiritual rituals around the preparation of food.

Compliance with ethical standards

Conflict of interest The author declares that he has no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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