

Full Length Article

What role do orthorectic beliefs play in orthorexia nervosa and healthy orthorexia? Development and validation of the Orthorexia Beliefs Scale (OBS)

María Roncero^a, Juan Ramón Barrada^{b,*}, Miriam Pitarch^b, Gemma García-Soriano^a

^a Departamento de Personalidad, Evaluación y Tratamientos Psicológicos, Facultad de Psicología y Logopedia, Universitat de València, Av. Blasco Ibáñez, 21, 46010, Valencia, Spain

^b Departamento de Psicología y Sociología, Universidad de Zaragoza, Zaragoza, Spain

ARTICLE INFO

Keywords:

Orthorexia nervosa
Healthy orthorexia
Dysfunctional beliefs
Orthorectic beliefs
Eating disorders
Obsessive-compulsive disorder

ABSTRACT

Cognitive models of obsessive-compulsive disorder (OCD) postulate that dysfunctional beliefs and appraisals are key elements in the development and maintenance of obsessions. Given the relationship between the orthorexia nervosa (OrNe), OCD, and eating disorders, it is not surprising that some dysfunctional beliefs are present in OrNe. The aim of this research was to determine the relevance of dysfunctional beliefs in OrNe. To do so, we developed and validated an instrument that assesses these beliefs –the Orthorexia Beliefs Scale (OBS)– and, subsequently, analyzed the association between orthorexia, food restriction, obsessive-compulsive symptoms, and negative/positive affect, along with the beliefs evaluated with the OBS. Participants ($n = 418$) were given a set of questionnaires. We expected the obtained instrument to be able to assess dysfunctional beliefs related to orthorexia and establish positive associations between pathological dimensions and OrNe. The results revealed that the scale evaluated three factors: Overvaluation of Healthy Eating, Moral Meaning, and Need to Control. OrNe was significantly associated with all three of these factors and the most relevant association was with the Need to Control factor. An association between the non-pathological variable of orthorexia (HeOr) and the Overvaluation of Healthy Eating factor was also found. The results seem to indicate that the dysfunctionality of orthorexia is highly marked by the need to control, as also occurs in eating disorders.

1. Introduction

1.1. Orthorexia nervosa and healthy orthorexia

Orthorexia comes from the Greek *ortho* and *orexis*, which means “right appetite”. The etymology of this word suggests that not all behaviors and approaches related to orthorexia should be associated with a problematic approach to food. In this regard, research indicates that the construct “orthorexia” can be divided into two dimensions: orthorexia nervosa (OrNe) and healthy orthorexia (HeOr; Barrada & Roncero, 2018).

It was not until 2022 that a consensus was reached on the diagnosis of OrNe by a panel of experts (Donini et al., 2022). According to this consensus –which has been criticized due to its overreliance on research conducted with questionnaires with known validity problems (Barrada

& Meule, 2024)–, OrNe is characterized by a strong preoccupation with “healthy” or “pure” eating. What is considered “healthy”, “pure”, or “clean” eating may vary from person to person, but generally refers to a diet composed of natural and organic foods as opposed to processed foods, which include added ingredients that are prepared, treated, toxic, or contaminated with elements that may be harmful to our health. As a consequence of their excessive preoccupation, individuals with OrNe experience clinically significant emotional distress and interference in their daily lives, including feelings of guilt and self-punishment, as well as social problems resulting from their strict ideas and rules (Donini et al., 2022).

As we have said, orthorexia should not be confused with OrNe. While OrNe is considered the pathological dimension, HeOr is characterized by an interest in the consumption of healthy foods, which is part of an individual's identity but does not become an excessive concern that

* Corresponding author.

E-mail addresses: maria.roncero@uv.es (M. Roncero), barrada@unizar.es (J.R. Barrada), 724507@unizar.es (M. Pitarch), gemma.garcia@uv.es (G. García-Soriano).

<https://doi.org/10.1016/j.appet.2025.107975>

Received 5 February 2024; Received in revised form 9 February 2025; Accepted 21 March 2025

Available online 5 April 2025

0195-6663/© 2025 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

generates distress and interference (Anastasiades & Argyrides, 2023; Barrada & Roncero, 2018; Chace & Kluck, 2022; Depa et al., 2019; Roncero et al., 2021). This differentiation is observed in their patterns of association: while OrNe tends to be associated with negative affect and symptoms of obsessive-compulsive and eating disorders (ED), HeOr exhibits null or negative relationships with these variables, highlighting its non-pathological aspect (Barrada & Roncero, 2018; Falgaes et al., 2023; Lasson et al., 2023; Strahler et al., 2020). HeOr has been associated with positive aspects. For instance, people with high HeOr show higher intuitive eating and a more positive body image (Anastasiades & Argyrides, 2023; Maïano et al., 2022).

Moreover, insofar as HeOr includes the self, it represents a different construct from healthy eating behaviors. In fact, high HeOr scores do not imply that the person is actually eating healthier (Zickgraf & Barrada, 2022), and vice versa. Although HeOr and healthy eating are positively associated (Halim et al., 2020; Zickgraf & Barrada, 2022), they are not equivalent. A person can be highly engaged with following their own standards of healthy eating, which can or cannot be, in fact, healthy. This is because official guidance provided by government-appointed public health experts –expected to be the most accurate– and lay beliefs about healthy eating tend to differ (Chan & Zhang, 2022; McDonald & Braun, 2022). Also, a person can follow a healthy diet with or without considering it relevant to their identity.

1.2. Orthorexia, eating disorders, and obsessive-compulsive disorder

OrNe shares a number of characteristics with EDs such as anorexia nervosa (AN), bulimia nervosa, and binge eating disorder. From now on, whenever we refer to EDs we will be considering these three diagnoses (AN, bulimia nervosa, and binge eating disorder), rather than all those included in the Feeding and Eating Disorders section of the DSM-5-TR, as these can be considered the three primary ED diagnoses (American Psychiatric Association [APA], 2022). EDs are characterized by an altered eating behavior that is primarily based on a preoccupation with weight and shape (APA, 2022). A review analyzing the relationship between OrNe and ED symptoms (mainly those related to AN and bulimia nervosa) concluded that there is indeed a significant association with several eating symptom factors, most notably the drive for thinness, while the association with other core factors, such as body dissatisfaction, was not consistent across studies (Atchison & Zickgraf, 2022). For their part, Hanras et al. (2024) found a very large association between OrNe scores and EDs.

OrNe has also been associated with obsessive-compulsive disorder (OCD) and obsessive-compulsive personality disorder. A recent meta-analysis indicates that symptoms of OCD present a significant association with OrNe, $r = .40$ (Huynh, Miles, De Boer et al., 2024). The presence of repetitive thoughts is observed in OrNe, EDs, and OCD. Ritualized behaviors, as well as other obsessive-compulsive personality traits such as rigidity and perfectionism, have also been found to be characteristic of EDs and, especially, restrictive AN. AN-restricting type describes presentations in which weight loss is accomplished primarily through dieting, fasting, and/or excessive exercise and in which the individual does not engage in recurrent episodes of binge-eating or purging behavior (APA, 2022). Perfectionism has also been associated with OrNe (Barrada & Roncero, 2018; Domingues & Carmo, 2020). In fact, this obsessive substrate could be the link between EDs –more specifically, AN restrictive subtype– and OrNe. The study of this relationship may provide clarifying data to gain a deeper understanding of the psychopathology of OrNe, as well as its association with HeOr.

1.3. Dysfunctional beliefs and psychopathology

Cognitive models of OCD suggest that dysfunctional beliefs and appraisals play a crucial role in the development and maintenance of obsessions in OCD (Rachman, 1997; Salkovskis, 1985). Based on these models, cognitive approaches for treating OCD focus on addressing these

beliefs in order to reduce the severity of symptoms (Beck & Haigh, 2014; Hellberg et al., 2020).

The Obsessive-Compulsive Cognitions Working Group (1997, 2001, 2003) agreed that the following six main belief domains about thoughts contribute to the development and maintenance of OCD. This theoretical model led to the development of the Obsessive Beliefs Questionnaire (OBQ; OCCWG, 2001) with the following theoretical dimensions:

- (1) *Overimportance of thoughts*: The belief that the mere presence of a thought makes it important and meaningful. This domain includes three different constructs: overestimate the importance of thoughts in a limited/narrow sense (attributing a personal and negative meaning to the thought), thought-action fusion likelihood (belief that having a thought increases the probability of it happening), and thought action-fusion moral (belief that having a thought is as morally reprehensible as actually carrying it out).
- (2) *Inflated responsibility*: The belief that the person has the capacity to produce or prevent negative events.
- (3) *Control of thoughts*: The belief that thoughts must be controlled and that this is possible and desirable.
- (4) *Overestimation of threat*: Overestimate the probability that something negative could happen or its severity.
- (5) *Intolerance to uncertainty*: The need to always be certain about everything.
- (6) *Perfectionism*: Excessive concern over mistakes.

It is important to note that the OBQ was not designed to measure OCD symptomatology. The OCCWG (2003) stated that “[a]ny new scientific approach to a psychological disorder requires that the key concepts and processes implicated in that perspective must be clearly articulated and amenable to measurement and experimentation” (p. 864). These beliefs were understood as processes that can cause and maintain OCD, but are not the OCD symptoms that constitute a diagnostic criteria.

While the six beliefs postulated by the OCCWG are related to OCD, none of them are specific to OCD (OCCWG, 1997), as they are relevant to other disorders such as depression or anxiety disorders (Belloch et al., 2010; Fergus & Carmin, 2014). In fact, some of them are also relevant in EDs, such as a specific belief of importance of thought, named thought-shape fusion. ED patients who exhibit thought-shape fusion feel that just having thoughts about food will cause weight gain (Shafran et al., 1999). Regarding control of thoughts, studies have shown that ED patients have the desire to control their thoughts, although due to the ego-syntonicity of the disorder at some stages, they do not always want their thoughts to go away, in contrast to OCD patients (Roncero et al., 2013). Related to the control of thoughts is the need to control, a core –and classic– concept in ED psychopathology. The need to control has been highlighted as a factor related to the development and maintenance of the disorder (Fairburn et al., 1999; Slade, 1982). In addition, perfectionism, albeit as a personality trait, has been posited as crucial in ED psychopathology (Fairburn et al., 1999; Lilienfeld et al., 2006).

Studies specifically analyzing the relationship between obsessive-related beliefs and ED symptoms show that when ED patients are compared to OCD patients, ED patients score comparably to or significantly higher than OCD groups on all OBQ factors (Lavender et al., 2006). Moreover, it has been observed that eating symptomatology in ED patients can be predicted by overestimation of threat and thought-action fusion morality, with small to medium effect sizes (Roncero et al., 2011). A significant correlation between ED symptoms and obsessive beliefs assessed with the OBQ has also been observed in college women without an ED diagnosis, with a small effect size (Humphreys et al., 2007).

Given the relationship of OrNe with ED and OCD, it is not surprising that some of the dysfunctional beliefs about thoughts studied in the OCD context could be particularly salient in OrNe. Recently, a small association has been observed between OrNe and obsessive dysfunctional

beliefs (Brytek-Matera et al., 2022), measured with the OBQ, with a maximum correlation of .22. The small size of these associations could be explained by the so-called *bandwidth-fidelity dilemma*: “maximum validity necessitates a higher degree of fidelity between the measure and the criterion” (Salgado, 2017). That is, general dysfunctional beliefs are better suited to predicting general psychopathology, while OrNe could be better explained by beliefs specifically related to healthy eating.

1.4. Aim of the present study

To confirm the relevance of certain beliefs in the onset or maintenance of OrNe, it would be interesting to measure these beliefs using a more focused measure that tailors them specifically to the aspects of healthy eating associated with orthorexia. This would be a questionnaire that specifically assesses core beliefs, which are not strictly captured in the OrNe or HeOr assessment questionnaires. This new measure would be, in terms of its goals, similar to the OBQ (OCCWG, 2001). The OBS and OBQ share the conceptualization of beliefs as key elements in psychopathology and that beliefs and disorders should not be confused. The availability of such a questionnaire could provide results that would broaden our psychopathological understanding of OrNe and could also have implications at a therapeutic level.

Therefore, the general aim of the present study was to explore the relevance of dysfunctional beliefs in orthorexia, mainly in relation to OrNe. In order to achieve this objective, our study was twofold. First, we developed and validated an instrument that assesses the dysfunctional general beliefs typically associated with OCD, as well as other disorders such as depression, anxiety, and eating disorders, but in this case adapted to the orthorexia content: the Orthorexia Beliefs Scale (OBS). Second, we analyzed the association between orthorexia, food restriction, obsessive-compulsive symptoms, and negative/positive affect with dysfunctional beliefs as assessed with the OBS. We expected to develop a valid and reliable questionnaire that captures the dysfunctional beliefs associated with orthorexia, and more specifically related to its pathological dimension. Furthermore, we hypothesized positive but lower associations with HeOr, and other psychopathological dimensions associated with orthorexia, such as restrictive ED symptomatology, OCD symptoms, and negative affect.

Although our focus is mainly on OrNe, we also assessed HeOr for three reasons. First, for completeness and coherence with the theoretical model that we consider that better describes orthorexia. Second, because comparing results between both elements of orthorexia helps to better understand both of them. Third, it allows to test convergent and divergent validity.

2. Development of the Orthorexia Beliefs Scale

The OBS was developed based on the Obsessive Beliefs Spanish Inventory-Revised (Belloch et al., 2010), a questionnaire created to assess dysfunctional beliefs, similar to the OBQ. Two additional dimensions of beliefs were included given their relevance to orthorexia (Barrada & Roncero, 2018; Cheshire et al., 2020): the overvalued ideation of healthy eating (e.g., “It is essential to have absolute clarity that the foods we eat are healthy”) and the need to control (e.g., “I should be able to control my thoughts about unhealthy food”).

Eighty-three items were developed by the first author of the current manuscript by referring to the subscales of the inventory (i.e., the main beliefs described in the literature as associated with OCD) but specifying them to beliefs about healthy eating (e.g., “Thinking about unhealthy foods is as unacceptable to me as eating them”). The other three authors, experts in orthorexia and OCD, reviewed the items and independently rated them in terms of clarity and relevance for orthorexia from 0 = *The item is poorly suited/unclear for the aspect being assessed. It should not be included in the test* to 2 = *The item is very suitable/clear for the assessed aspect. It should be included in the test*. After the review, 16 of the items were rewritten and 11 items were deleted because they were not

considered relevant enough or the content was too similar to other items, and thus a version of 72 items was analyzed.

Another difference between the OBS and the OBQ is that, while all items of the OBQ reflect personal beliefs or maxims that are applied to oneself (intrapersonal items; e.g., “I must be certain of my decisions” or “For me, not preventing harm is as bad as causing harm”), the OBS mixes these intrapersonal items with other items in which those standards are applied to others (interpersonal items; e.g., “Everyone should follow a strict diet made up of healthy foods” or “Following a healthy diet should be the most important thing in our lives”). We did this because those items were rated as relevant for assessing the construct and some degree of over-inclusiveness in item content is advisable in the initial stages of test development (Clark & Watson, 1995).

3. Method

3.1. Procedure and participants

The data were collected through LimeSurvey. For dissemination, various social networks, such as Facebook and Instagram, were used. Participants were invited to participate in a study on healthy eating habits and their relationship with psychological variables. In order to participate, participants had to read and accept the informed consent form, which assured the anonymity of their answers. No participant received financial compensation for their collaboration and this research was approved by the Ethics Committee of the University of Valencia (code UV-INV_ETICA-1533796).

The sample collected was of 418 participants (72.7 % women, 26.8 % men and 0.5 % others), with a median age of 26.0 years (first quartile = 22.0, third quartile = 43.7). Most of them lived in Spain (97.6 %). Regarding educational level, 0.5 % participants had not completed their studies, 3.1 % had completed primary school or equivalent, 3.8 % had completed secondary school or equivalent, 30.6 % had completed high school or intermediate studies, 19.4 % had completed higher education, 25.4 % had completed undergraduate university studies, and 17.2 % had completed postgraduate university studies. Regarding self-reported socioeconomic level, 4.1 % were classified as low, 25.8 % medium-low, 56.7 % medium. 13.2 % medium-high, and 0.2 % high.

3.2. Instruments

Sociodemographic data. Participants provided information related to their age, gender, country of residence, educational level, profession, socioeconomic level, and marital status.

Orthorexia Beliefs Scale (OBS). This is the self-report questionnaire under study. The initial version consists of 72 items with response options ranging from 0 = *completely disagree* to 3 = *completely agree*. The final version of the OBS is presented in the supplementary materials.

Teruel Orthorexia Scale (TOS; Barrada & Roncero, 2018). It consists of 17 items that assess orthorexia in two dimensions: nine of them assess HeOr (e.g., “My interest in healthy eating is an important part of my way of being, of understanding the world”) and the remaining eight assess OrNe (e.g., “I feel guilty when I eat food that I consider unhealthy”). The response options range from 0 = *completely disagree* to 3 = *completely agree*. In this sample, Cronbach’s alpha for HeOr was .86 and .84 for OrNe.

Diet dimension of the Eating Attitudes Test-26 (EAT-26; Garner et al., 1982). The Diet factor is composed of 13 items (e.g., “I try not to eat foods containing sugar”). The response options range from 1 = *never* to 6 = *always*. The Diet scale showed a Cronbach’s alpha of .86. The Spanish version was used (Castro et al., 1991). We only used the Diet dimension as it is theoretically and empirically more closely related to OrNe (Barrada & Roncero, 2018; Barthels et al., 2019).

Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002). The OCI-R is a self-report questionnaire that assesses distress caused by obsessive-compulsive symptoms. The OCI-R contains 18-items (e.g., “I

find it difficult to control my own thoughts”) rated on a 5-point scale ranging from 0 = *Not at all* to 4 = *Extremely*. Cronbach’s alpha in the present sample was .87. We used the Spanish version (Fullana et al., 2005).

Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). It consists of 20 items assessing affect in two dimensions: 10 items for positive affect (e.g., “interested, showing interest in people or things”) and 10 items for negative affect (e.g., “stressed, feeling upset or overwhelmed”). The response options range from 1 = *not at all or very slightly* to 5 = *very much*. In this sample, Cronbach’s alpha was .87 for Positive Affect and .90 for Negative Affect. The Spanish version was used (Sandín et al., 1999).

3.3. Statistical analyses

First, we analyzed the internal structure of the OBS scores with an exploratory structural equation model (Asparouhov & Muthén, 2009). In order to determine the number of dimensions to be retained –which

could not be anticipated before data analysis—we used parallel analysis (Garrido et al., 2013). We used the initial item pool of 72 items to develop a final and reduced item pool, with a clear and simple factor structure and high loadings, to achieve high reliability with a short measure. For this purpose, only items with primary loadings over $|.50|$ and no cross-loading greater than $|.30|$ were retained and at least five items were assigned to each factor.

Given the use of a 4-point Likert scale, models were analyzed using robust weighted least squares (WLSMV estimator in MPlus). According to conventional cut-offs (e.g., Hu & Bentler, 1999), values over .95 for the comparative fit index (CFI) and Tucker-Lewis index (TLI) indicate an adequate fit to the data, respectively, whereas values under .06 for the root mean square error of approximation (RMSEA) and under .08 for standardized root mean square residual (SMSR) indicate an acceptable model fit. It should be noted that these cut-offs were developed for confirmatory factor analysis with continuous responses, so they should be interpreted with caution (Xia & Yang, 2019). Additionally, these cut-off values should be considered as rough guidelines and not

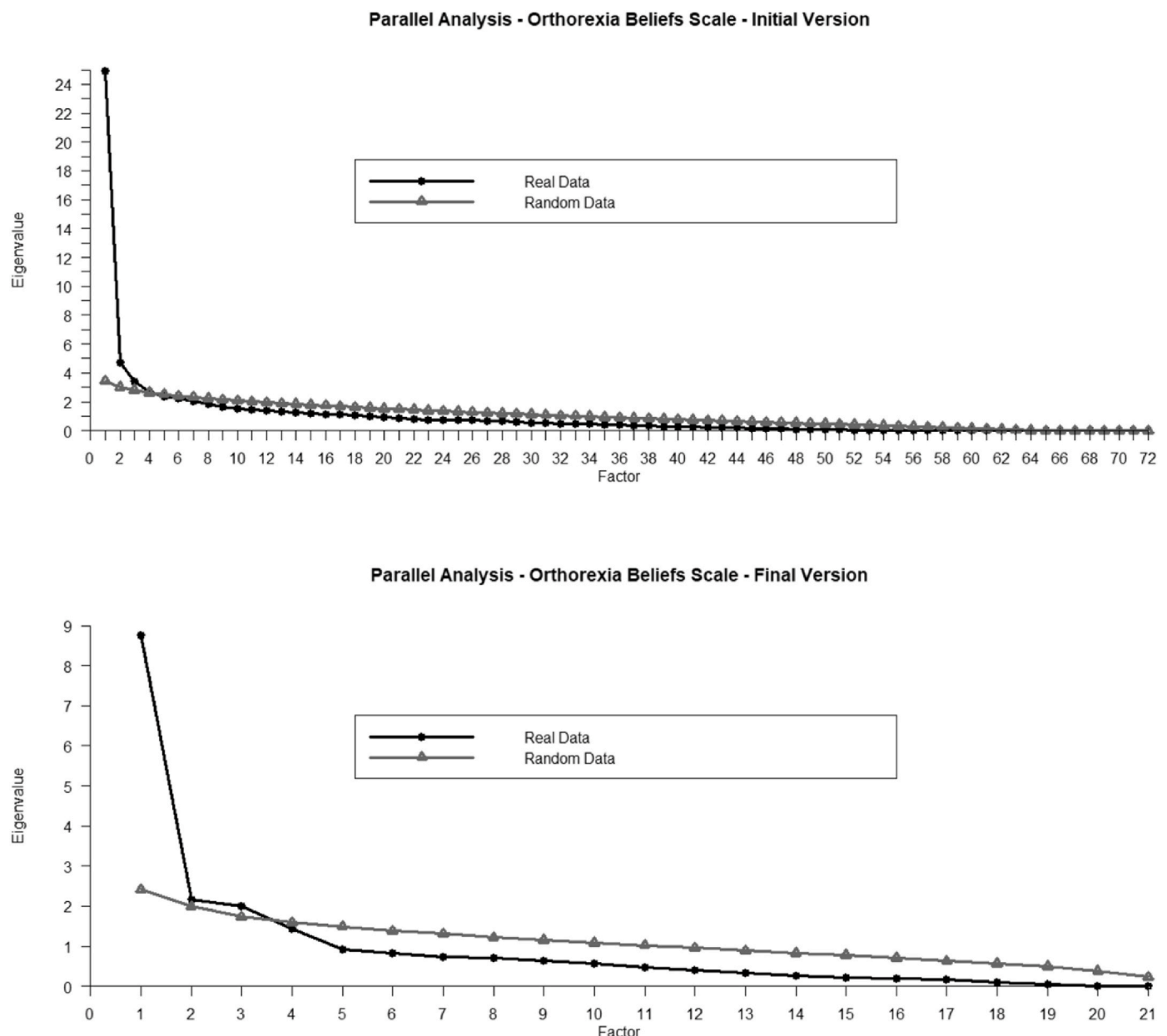


Fig. 1. Parallel analysis of the Orthorexia Beliefs Scale responses with the initial version (72 items) and final version (21 items).

interpreted as “golden rules” (Marsh et al., 2004).

We computed descriptive statistics (means, standard deviations, skewness, and kurtosis) and correlations between the different orthorectic belief dimensions and the five additional variables (TOS OrNe, TOS HeOr, EAT Diet, and PANAS Negative and Positive Affect). We present Pearson correlations for all the bivariate associations. Considering that OrNe and HeOr can be expected to partially overlap, we computed partial correlations for all the associations between orthorexia and other variables while controlling for the other orthorexia dimension. By doing so, we expected to better assess the associations of HeOr (or OrNe) with the different psychopathological indicators while controlling for OrNe (or HeOr). We compared the correlation sizes for the six additional variables and the OrNe scores using Hittner et al.’s technique (Hittner et al., 2003), specifically by checking if the subtraction between the correlations with OrNe and the other variables was different from zero. Considering the content of the OBS, specifically tailored to dysfunctional beliefs about healthy eating, we expected the correlations with OrNe to be the highest. We computed linear regression models with OrNe, HeOr, Diet, OCI-R, and the two affects as criteria and the different beliefs scores as predictors to test if the orthorectic beliefs explained OrNe scores to a larger degree. We report standardized coefficients for these regression models. The analyses were performed with MPlus 8.4 and R 4.2.2. The open database and code files for these analyses are available at the Open Science Framework repository (<https://osf.io/daxkw/>).

4. Results

4.1. Internal structure of the OBS

The parallel analysis results can be seen in Fig. 1. Four eigenvalues from the sample (24.94, 4.74, 3.38, 2.68) were greater than the eigenvalues from the randomly generated datasets (3.43 3.01 2.82 2.63), although the difference for fourth eigenvalues was very small. Considering this information, we tested a four-factor solution. Although model fit was satisfactory overall [$\chi^2(2274) = 3084.8$, CFI = .950, TLI = .944, RMSEA = .029, SRMR = .059], this structure presented several important limitations: (a) 30 items showed no loading over .50 in any factor; (b) of those items with a clear primary loading, 18 presented at least a relevant cross-loading over .30; and (c) the fourth factor was not identified by any item without relevant cross-loadings. This implied that the theoretical interpretation and scoring of the factors was impaired.

This led us to test a three-factor model with a shorter, 24-item version (72 – 30 – 18 = 24) of the questionnaire. Fit indices were satisfactory for this model [$\chi^2(207) = 373.0$, CFI = .967, TLI = .956, RMSEA = .044, SRMR = .049]. After inspecting this solution, we decided to remove only three items, two for not loading over .50 in any factor and one item for relevant cross-loading. The fit in this final 21-item version was also adequate [$\chi^2(150) = 303.6$, CFI = .967, TLI = .954, RMSEA = .049, SRMR = .045] and no problematic pattern of loadings was found. We cross-checked the number of factors to be retained with this final version with another parallel analysis. This technique indicated the convenience of extracting three factors (current sample eigenvalues: 8.75, 2.17, 2.00; randomly generated datasets eigenvalues: 2.41, 1.99, 1.74).

The item wording and loadings are shown in Table 1. The theoretical interpretation of the three factors was clear. We labeled the first factor as Overvaluation of Healthy Eating, where eight items presented their primary loading (e.g., “It is essential to have absolute clarity that the foods we eat are healthy”). We interpreted the second factor as Moral Meaning. Seven items were assigned to this factor (e.g., “Thinking about eating unhealthy foods means that I am immoral”). The third factor was labeled as Need to Control, with six items (e.g., “If I think about foods that aren’t healthy, I’ll lose control and eat them”). The mean loadings for Overvaluation of Healthy Eating, Moral Meaning, and Need for Control items were .69, .75, and .66, respectively. The secondary loadings were small (mean = .09, max = .27). The interfactor correlations

Table 1

Item loadings of the Orthorexia Beliefs Scale.

	OHE	MM	NC
It is essential to have absolute clarity that the foods we eat are healthy	.83	–.02	.03
I should have absolute certainty that the food I eat is healthy	.78	–.09	.04
Having a healthy diet is a very important value in my life	.77	–.03	.02
I must do everything in my power to have a healthy diet	.74	–.01	.02
It is essential to check a food’s label to make sure that it is healthy and I can eat it	.68	.10	.10
Everyone should follow a strict diet made up of healthy foods	.62	.17	–.07
It is necessary to strictly follow certain rules when preparing food so that your diet is healthy	.57	.01	.22
Following a healthy diet should be the most important thing in our lives	.56	.22	–.08
Thinking about eating unhealthy foods means that I am immoral	–.11	.88	.24
Only people who follow a healthy diet perfectly are worthy of respect	–.12	.82	.04
Knowing whether someone follows a healthy diet informs my opinion of him or her	.00	.80	.01
To really know a person it’s important to know about their eating habits	.08	.79	–.11
Thinking about unhealthy foods seems just as unacceptable to me as eating them	.00	.69	.22
If the food available isn’t 100 % healthy, it is preferable not to eat at all	.05	.62	.27
Following a healthy diet makes you a better person	.16	.62	–.05
If I think about foods that aren’t healthy, I’ll lose control and eat them	–.12	.00	.83
If I start to eat unhealthy foods, it’ll be hard to stop	.01	–.02	.74
Thinking about eating unhealthy foods means that I actually want to eat them	–.08	–.04	.72
Despite my best efforts, I often think that my diet is unhealthy	.13	.04	.59
Thoughts about not healthy foods are negative	.03	.26	.56
I should be able to control my thoughts about unhealthy foods	.22	.05	.52

Note. OHE = Overvaluation of Healthy Eating, MM = Moral Meaning; NC = Need for Control. Bold values correspond to loadings over .50|.

were $r_{\text{Overvaluation, Moral}} = .56$, $r_{\text{Overvaluation, Control}} = .37$, and $r_{\text{Moral, Control}} = .42$.

The internal consistencies of all the three derived scales were equal to or higher than .77: $\alpha_{\text{Overvaluation}} = .87$, $\alpha_{\text{Moral}} = .79$, and $\alpha_{\text{Control}} = .77$.

4.2. Descriptives, associations between variables, and regressions

Table 2 shows the descriptive statistics and the correlations (Pearson, partial, and differences). Regarding the descriptives and focusing on the OBS scores, while a floor effect was present for Need to Control and, more markedly, for Moral Meaning ($kurtosis_{\text{Moral}} = 13.1$, $kurtosis_{\text{Control}} = 2.6$), the distribution of the Overvaluation of Healthy Eating scores was largely symmetrical ($skewness_{\text{Overvaluation}} = 0.4$, $kurtosis_{\text{Overvaluation}} = -0.6$). The distribution of the three OBS scores can be seen in Fig. 2.

The pattern of correlations between belief scores and the additional variables greatly varied by OBS dimension. For OrNe/HeOr, the correlations with Overvaluation of Healthy Eating were $r = .37/.53$; for Moral Meaning, $r = .33/.24$; and for Need to Control, $r = .50/.02$. All these correlations were statistically significant, except the last one. All three dimensions of beliefs were positively correlated with Diet scores, r s in the range of [.26, .46]; with OCI-R scores, r s in the range of [.17, .38]; and with Negative Affect scores, r s in the range of [.12, .33]. All these correlations were statistically significant. For Positive Affect, only Need to Control presented a correlation different from zero, $r = -.21$.

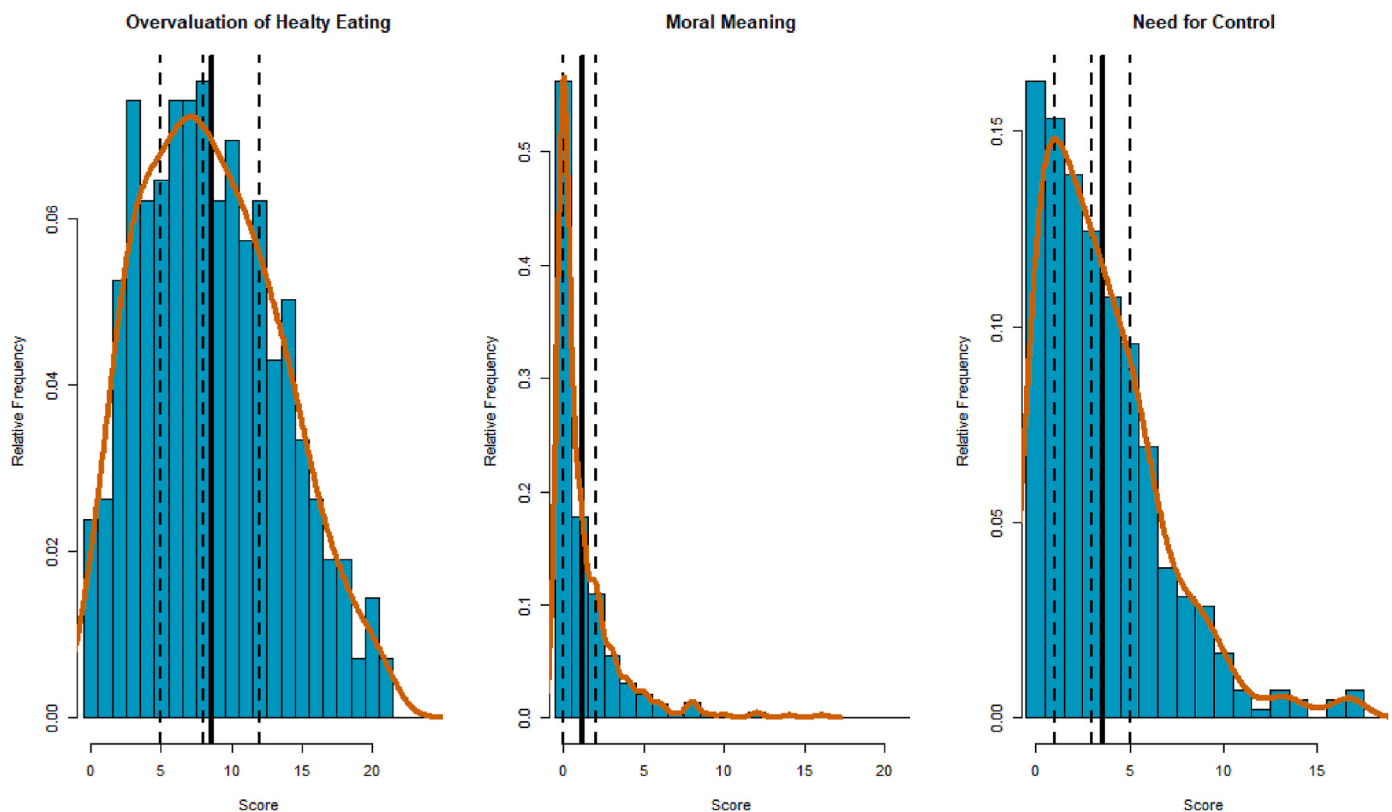
Except for Overvaluation of Healthy Eating, the results of the partial correlations for OrNe, when controlling for HeOr, were almost equivalent to those for the Pearson correlations. The maximum unsigned change was .08 for Positive Affect ($r = -.17$ and $r_p = -.25$). In the case of

Table 2

Descriptive statistics and correlations (Pearson, partial, differences) between the different scores.

	1	2	3	4	5	6	7	8	9	OrNe	HeOr	OHE	MM	NC
	Pearson Correlations									Partial Correlations		Differences in r with OrNe		
1. TOS OrNe										–	–	–	–	–
2. TOS HeOr	.38									–	–	–.16	.09	.48
3. EAT Diet	.68	.28								.65	.03	–.01	.07	.04
4. OCI-R	.28	.10	.37							.26	–.01	.06	.16	.12
5. PANASNegAf	.31	–.03	.30	.54						.35	–.17	.21	.21	.17
6. PANASPosAf	–.17	.14	–.15	–.08	–.18					–.25	.23	.38	.33	.71
7. OBS OHE	.37	.53	.38	.31	.16	.00				.22	.45	–	–	–
8. OBS MM	.33	.24	.26	.17	.12	.00	.45			.27	.13	–	–	–
9. OBS NC	.50	.02	.46	.38	.33	–.21	.38	.37		.53	–.22	–	–	–
	Descriptives													
Mean	3.8	11.9	28.7	17.3	21.1	33.3	8.6	1.2	3.5					
Standard Deviation	3.9	5.3	10.3	10.9	8.2	6.6	4.9	2.1	3.2					
Skewness	1.8	0.1	0.8	0.8	0.8	–0.3	0.4	3.1	1.4					
Kurtosis	4.8	–0.5	0.7	0.2	0.3	0.0	–0.6	13.1	2.6					

Note. TOS = Teruel Orthorexia Scale; OrNe = orthorexia nervosa; HeOr = Healthy Orthorexia; EAT = Eating Attitudes Test-26; OCI-R = Obsessive-Compulsive Inventory-Revised; PANAS = Positive and Negative Affect Schedule; NegAf = Negative Affect; PosAf = Positive Affect; OBS = Orthorexia Beliefs Scale; OHE = Overvaluation of Healthy Eating; MM = Moral Meaning; NC = Need to Control. Partial correlations are controlling for the other orthorexia dimension. Differences in r correspond to differences in the Pearson correlation between each OBS dimension and OrNe or another variable. Bold values correspond to statistically significant coefficients, $p < .05$.

**Fig. 2.** Distribution of the Orthorexia Beliefs Scale scores by dimension

Note. Solid vertical line corresponds to the mean value. Dashed vertical lines, from left to right, correspond to first, second (median), and third quartile. Brown lines correspond to the density plot.

Overvaluation of Healthy Eating, the correlation was reduced from $r = .37$ to $r_p = .22$.

The partial correlations for HeOr, when controlling for OrNe, diverged to a greater degree. The correlations became negligible and not statistically significant with Diet ($r_p = .03$) and OCI-R ($r_p = -.01$), negative and statistically significant for Negative Affect ($r_p = -.17$), and higher for Positive Affect ($r_p = .23$). The associations with the belief scores were reduced for the Overvaluation of Healthy Eating ($r = .53$, $r_p = .45$) and Moral Meaning ($r = .24$, $r_p = .13$) dimensions. For Need to

Control, the Pearson correlation was previously not significant, but the partial correlation was negative and statistically significant ($r = .02$, $r_p = -.22$).

Given that we developed what we expected to be a questionnaire about problematic beliefs about healthy food and that OrNe should be the most related variable to those beliefs, we compared the correlation sizes of each of the three belief scores with OrNe and each of the other variables. For instance, $r_{\text{OrNe, Control}} = .50$ and $r_{\text{HeOr, Control}} = .02$, so the difference was .48. That difference was statistically significant, that is,

Table 3
Multiple regression analyses for the different criteria variables.

	TOS OrNe				TOS HeOr				EAT Diet			
	R^2_{adj}	F	p	R^2_{adj}	R^2_{adj}	F	p	R^2_{adj}	R^2_{adj}	F	p	R^2_{adj}
OBS OHE	.29	58.65	< .001	.32	.32	65.65	< .001	.26	.26	49.37	< .001	.26
OBS MM	0.18	3.67	< .001	0.59	0.59	12.62	< .001	0.23	0.23	4.67	< .001	0.23
OBS NC	0.10	2.17	.030	0.05	0.05	1.12	.264	0.02	0.02	0.42	.676	0.02
	0.40	8.66	< .001	-0.22	-0.22	-4.95	< .001	0.37	0.37	7.88	< .001	0.37
	OCI-R				PANAS Negative Affect				PANAS Positive Affect			
	R^2_{adj}	F	p	R^2_{adj}	R^2_{adj}	F	p	R^2_{adj}	R^2_{adj}	F	p	R^2_{adj}
OBS OHE	.17	30.42	< .001	.11	.11	17.66	< .001	.05	.05	8.10	< .001	.05
OBS MM	0.21	4.10	< .001	0.04	0.04	0.83	.409	0.07	0.07	1.18	.240	0.07
OBS NC	-0.04	-0.85	.399	-0.02	-0.02	-0.39	.698	0.07	0.07	1.19	.236	0.07
	0.32	6.44	< .001	0.33	0.33	6.32	< .001	-0.26	-0.26	-4.93	< .001	-0.26

Note. TOS = Teruel Orthorexia Scale; OrNe = orthorexia nervosa; HeOr = Eating Attitudes Test-26; OCI-R = Obsessive-Compulsive Inventory-Revised; PANAS = Positive and Negative Affect Schedule; OBS = Orthorexia Beliefs Scale; OHE = Overvaluation of Healthy Eating; MM = Moral Meaning; NC = Need to Control. Bold values correspond to statistically significant results, $p < .05$.

Need to Control scores were significantly more correlated with OrNe than with HeOr. While Need to Control scores were significantly more correlated with OrNe than with OCI-R, Negative Affect, and Positive Affect (changes in correlation between .12 and .71), the difference in correlations were not statistically significant for EAT Diet. While differences in the associations with Moral Meaning scores were again statistically significant for OCI-R and Positive and Negative Affect (changes between .16 and .33), those differences were not significant for HeOr and Diet. Finally, for the Overvaluation of Healthy Eating scores the associations were statistically higher for Positive and Negative Affect (differences were .21 and .38), lower with OrNe than with HeOr (differences was -.16), and with no significant differences for EAT Diet and OCI-R.

With regard to regression models, which can be seen in Table 3, OrNe had Need to Control ($\beta = 0.40$), Overvaluation of Healthy Eating ($\beta = 0.18$), and Moral Meaning ($\beta = 0.10$) as statistically significant and positive predictors. For HeOr, the statistically significant coefficients were those of Overvaluation of Healthy Eating ($\beta = 0.59$) and Need to Control ($\beta = -0.22$).

The highest explained variance was for the HeOr scores ($R^2_{adj} = .32$), followed by OrNe ($R^2_{adj} = .29$) and EAT Diet ($R^2_{adj} = .26$). For the other variables, the results were $R^2_{adj} = .17$ for OCI-R, $R^2_{adj} = .11$ for Negative Affect, and $R^2_{adj} = .05$ for Positive Affect. Regarding the Need to Control scores, the beta coefficient for this variable was statistically significant and the highest one for all the models except the one for HeOr. Overvaluation of Healthy Eating scores were positively and significantly related to all variables except the two affects, with the highest beta coefficient being for HeOr. The coefficients for the Moral Meaning scores were much smaller and only statistically significant in the OrNe model.

5. Discussion

As the OCCWG (2003) noted, “a critical element in the pathogenesis of obsessions, in particular, was the meaning that the obsession had to the person suffering from OCD”. In line with this, the aim of the present study was to better understand the structure and association of dysfunctional beliefs about healthy eating (that is, maladaptive meanings), with orthorexia. To do this, we developed a questionnaire to assess those beliefs (i.e., importance of thoughts, inflated responsibility, overestimation of threat, intolerance to uncertainty, perfectionism, and need for control as a starting point for item development), adapted to the content of the excessive preoccupation with healthy eating, as there was no available instrument for doing so. Our goal was not to develop a new questionnaire for assessing orthorexia, but to create an instrument that addresses the cognitive processes related to orthorexia. Therefore, the OBS should not be considered as a substitute for other orthorexia measures.

5.1. Structure of the dysfunctional orthorectic beliefs

After the analysis of the 72 items, the best solution for the OBS –in terms of clear and interpretable structure– was found with a version composed of 21 items and three factors. The first factor includes value and belief items reflecting that healthy eating is essential in people's lives (e.g., “It is essential to have absolute clarity that the foods we eat are healthy”, “I should have absolute certainty that the food I eat is healthy”). For this reason, we chose to call this factor Overvaluation of Healthy Eating, following Veale's (2002) definition of overvalued ideas. This author defines overvalued ideas as “[b]eliefs that are associated with specific values, which have become dominant and idealized [...]; the value has become excessively identified with the self” (p. 388). Within this factor, the importance of following a healthy diet in a strict, rigid, and inflexible way is reflected (e.g., “It is necessary to strictly follow certain rules when preparing food so that your diet is healthy”).

The factor Need to Control includes items that reflect fear of lack of control. This lack of control can start with thoughts (“If I think about foods that aren’t healthy, I’ll lose control and eat them”) or behavioral deviation from health standards (“If I start to eat unhealthy foods, it’ll be hard to stop”). This is of particular interest because it is precisely control (and the anxiety associated with lack of control) that has been highlighted in studies as a core aspect in the psychopathology of orthorexia nervosa (Cheshire et al., 2020; Syurina et al., 2018). However, its role in relation to the non-pathological aspect of healthy eating concerns (HeOr) was not known.

Finally, the Moral Meaning factor reflects the importance of taking into account how people eat when judging them: “To really know a person it’s important to know about their eating habits” or “Only people who follow a healthy diet perfectly are worthy of respect”. Moral Meaning also includes items associated with the belief that having thoughts about eating healthy food is moral, whereas having thoughts about unhealthy food is immoral (“Thinking about eating unhealthy foods means that I am immoral”). These items collect the so-called *thought-action fusion morality*, that is, having a thought is morally equivalent to carrying it out.

An interesting aspect is to analyze which of the dysfunctional beliefs that were suggested by the OCCWG (1997, 2001) as particularly relevant for the pathogenesis of OCD (i.e.: importance of thoughts, inflated responsibility, control of thoughts, overestimation of threat, intolerance to uncertainty, perfectionism) were most represented in the new scale after being adapted to the content of healthy eating. After the statistical analyses, the 21 items that were included in the final version were those referring to the beliefs of the need for thought control and the importance of thoughts (including beliefs of thought-action fusion probability and thought-action fusion moral), and perfectionism. Other factors such as overestimation of threat (e.g., “If I think about foods that aren’t healthy, I’ll lose control and eat them”) and inflated responsibility (e.g., “I must do everything in my power to have a healthy diet”) appeared reflected in the OBS. However, the belief related to intolerance of uncertainty was not represented in the final version. This dysfunctional belief has been found across studies to be a core transdiagnostic feature in internalizing disorders (Gentes & Ruscio, 2011; McEvoy et al., 2019), also within eating disorders (Brown et al., 2017). As far as we know, no study has analyzed the relationship between intolerance to uncertainty and OrNe using an instrument with adequate psychometric properties. Although our results suggest that intolerance of uncertainty is not a core dysfunctional belief for orthorexia, it would be interesting for future studies to examine its possible association.

As we noted in the introduction, the OBS presents items with intra-personal and interpersonal points of reference. This distinction, given our results, is not relevant for the structure of the beliefs about healthy eating, as those two kinds of items did not load into separate factors.

5.2. Relationship between beliefs and psychopathological constructs

The second aim was to evaluate the association between orthorexia, food restriction, obsessive-compulsive symptoms, and negative/positive affect with orthorexia beliefs. We expected to find positive associations mainly between dysfunctional orthorexia beliefs and the pathological factor of orthorexia (OrNe), but also with food restriction, obsessive-compulsive symptoms, and negative affect. However, we did not expect to find associations between dysfunctional orthorexia beliefs and the healthy factor of orthorexia (HeOr) or with positive affect. Most of the associations were significant (all except one), and ranged from .53 to .02, demonstrating that the OBS measures were related, but not identical, aspects of those assessed with the other scales.

5.2.1. Relationship between beliefs and OrNe

It is interesting to note the pattern of associations found among OrNe and HeOr with orthorexia beliefs, which do not totally support our hypothesis. OrNe was significantly associated with the three orthorexia

belief factors, mainly with Need to Control. This result suggests that the core issue for people presenting high OrNe levels would be the need to control their eating behavior. This is not surprising, as qualitative studies have shown that the desire to control is a primary feature of OrNe, as noted by professionals attending OrNe patients (Cheshire et al., 2020; Syurina et al., 2018). It has been suggested that controlling overeating helps patients with OrNe manage other distress in their lives and also their need for control over their thoughts: “one of our participants described how even just thinking about eating an ice-cream could send her into an uncontrollable spiral of anxiety” (Cheshire et al., 2020, p. 5). Control is also an essential part of “healthism”, the belief that people can –and must– be responsible for managing and improving their own health (Hanganu-Bresch, 2020).

Moreover, it is interesting that the Need to Control is precisely the most relevant belief for OrNe, given how it represents a core aspect of psychopathology for ED (Fairburn et al., 1999; Slade, 1982). The need to control has also been related to OrNe (Greville-Harris et al., 2020; Vuillier et al., 2025). The results of the present study, consistent with this idea, show that the Need to Control belief (it is necessary and possible to control not only healthy eating but also the thoughts about it) has the strongest relationship with restraint as a symptom of ED (Diet factor of the EAT-26). A systematic review of metacognitive beliefs and ED found that the need to control thoughts was especially relevant in AN restrictive type (Palmieri et al., 2021). ED restraint (Diet factor) has shown a pattern of associations with orthorexia beliefs similar to those found in OrNe, consistent with the similarities between both disorders (more specifically with restrictive AN) postulated in previous theoretical, clinical and empirical studies (Bhattacharya et al., 2022; Dell’Osso et al., 2016; McComb & Mills, 2019), and more recently, in the description of OrNe (Donini et al., 2022). Although we consider that it is important to emphasize that restraint and OrNe can be differentiated and show differential associations with key variables, like gender or body mass index (Barthels et al., 2019), it is intriguing that the OBS (whose content is directly related to healthy eating, not restraint) exhibits very similar associations with Diet and OrNe.

It is also of interest that the correlations found between OrNe and the OBS are much larger than those found with the OBQ. While Brytek-Matera et al. (2022) found a maximum correlation of .22 when using a measure of general dysfunctional beliefs –the OBQ–, the associations that we found are much larger, with a maximum correlation of .50. This indicates the convenience of using more focused assessments: when trying to understand the associated dysfunctional beliefs of OrNe it is better to ask about healthy eating beliefs.

The pattern of associations between the Overvaluation of Healthy Eating dimension and OrNe, both in correlation and regression model, offers preliminary evidence that this is not a core element of OrNe. These results shed some light on the discrepancies in the role of overvalued ideas about healthy eating as a diagnostic criteria for OrNe. While those ideas have been proposed as diagnostic criteria in different proposals for OrNe (for an overview, see Cena et al., 2019), they are not part of the recent consensus document (Donini et al., 2022).

5.2.2. Relationship between beliefs and HeOr

Regarding HeOr, a different pattern of associations has been found compared to OrNe, consistent with previous findings (Anastasiades & Argyrides, 2023; Chace & Kluck, 2022; Falgares et al., 2023; Hallit et al., 2021; Roncero et al., 2021; Strahler, 2021). The results show that HeOr was mainly associated with the Overvaluation of the Healthy Eating factor. The content is consistent with the main idea of HeOr, according to which healthy eating is a very important aspect of a person’s life. However, the relationship with Overvaluation of Healthy Eating being significant and greater than that found between OrNe and this factor was not expected. Recently, Ng et al. (2024) noted that “some of the thoughts and behaviors captured by items on the HeOr scale could be described as rigid”. In fact, the factor Overvaluation of Healthy Eating had positive associations with the remaining dysfunctional factors (EAT Diet, OCI-R,

PANAS Negative Affect).

Regarding the Moral Meaning factor, it was also significantly associated with HeOr, showing that people who tend to score higher in HeOr consider it important to know whether people maintain a healthy diet in order to judge them on a moral level. Despite the associations found between HeOr and OBS, it is worth noting that the HeOr factor had no relationship with eating symptomatology, obsessive-compulsive, or negative affect in the partial correlations, supporting its non-pathological aspect.

Examining the associations between OrNe and HeOr in relation to the belief factors, the pattern found is interesting: there is a positive relationship between HeOr and the Overvaluation and Moral factors and a negative relationship with Need to Control. However, OrNe was associated with all three factors, mainly with Need to Control. This differential pattern of OBS beliefs with OrNe and HeOr opens up new perspectives to deepen our understanding of the psychopathology of orthorexia. The results found seem to indicate that the dysfunctionality of orthorexia is more determined by the need to control (a transdiagnostic factor shared with ED and OCD) than by the overvaluation of healthy eating itself. Future studies should further explore the role of the need to control as a transdiagnostic element by looking at the relationship between orthorexia, eating disorders –including avoidant/restrictive food intake disorder– and obsessive-compulsive spectrum disorders, including disorders such as OCD and body dysmorphic disorder.

5.2.3. Relationship between beliefs and other psychopathological constructs

Diet scale (EAT-26), obsessive-compulsive symptomatology (OCI-R), and Negative affect (PANAS) were also associated with the three OBS factors, mainly with Need to Control, followed by Overvaluation of Healthy Eating and Moral Meaning, which, in fact, did not emerge as a predictor in the regression analyses. It is interesting to note that the association between food restriction (Diet scale EAT-26) and OBS factors was higher than the association between OCI-R and OBS factors, in line with the suggestion that obsessive-related beliefs –mainly when addressing eating behaviors– are also very relevant for ED (Lavender et al., 2006; Roncero et al., 2011). Importantly, the specific dysfunctional beliefs assessed by the OBS explain OrNe to a larger degree than obsessive-compulsive beliefs, as seen in a previous study (Brytek-Matera et al., 2022). Finally, Positive Affect was inversely associated with only Need to Control, suggesting the more dysfunctional load of this factor, consistent with the associations found with psychopathology factors (all except HeOr).

5.3. Limitations and future directions

The present study presents some limitations. First, the sample was collected through social media where a study related to beliefs about healthy eating was announced. This could have biased our participants to those particularly interested in the topic and not representative of the general population. The distributions of TOS scores in the present study are similar to those found in previous studies (e.g., Barrada & Roncero, 2018), although it could be possible that all these publications share the same sampling problems.

Second, given the number of items that were dropped from the initial version of the OBS to the final version, further research should cross-validate it. To obtain a solid instrument, hopefully with a stable structure in further studies, we established stringent criteria in item loadings to be retained. This approach is shared with the development of the TOS (Barrada & Roncero, 2018), although, in that case the sample size was larger.

Third, we did not analyze all the available information in our database. More specifically, we had responses about gender, age, height and weight (so body mass index could have been computed). We acknowledge that the relationships between these variables and orthorexia and orthorectic beliefs are of interest. We decided not to incorporate them to

keep the focus of our manuscript, as those analysis were beyond the aims of our study. We note again that our dataset and script are available at Open Science Framework repository (<https://osf.io/daxkw/>), so others can pursue that line of research.

Fourth, the Moral Meaning showed small associations with OrNe and HeOr, mainly after controlling for the other belief dimensions. Some might interpret that we have developed a questionnaire in which one out of three dimensions is largely trivial and could therefore be discarded. It is important to note that this interpretation comes after data were collected and analyzed. Before that, those items should have been clearly incorporated into a questionnaire intended to measure dysfunctional beliefs in order to attain content validity. Given our results –which we value as relevant, precisely in part as they were unexpected–, and considering that further replications of this line of research are recommended, the inclusion or exclusion of the Moral Meaning in the assessment of orthorectic beliefs will depend on the intended uses of the OBS. If a more comprehensive analysis is desired, our advice would be to keep this dimension. Also, if the studied sample is expected to present higher OrNe scores, a lower floor effect on the Moral Meaning dimension could be anticipated. If short measures are needed, this dimension seems a good way to reduce survey length.

Fourth, our starting point to generate items about healthy eating beliefs was the OBQ and its surrounding models which were originally developed with OCD in mind. Test construction without any guiding reference would have been more difficult if not impossible. There were several reasons to adopt the OBQ model. Beliefs have been a central component of OCD models for decades and it can be argued that significant advancements have been made in this area. The OBQ model is comprehensive and covers a wide range of beliefs. When developing a new instrument some degree of over inclusiveness, in combination with the large number of items, is recommended, in order to further assess item quality based on participant responses (Clark & Watson, 1995). Our analysis allowed to discard or combine dimensions based on need. Finally, those beliefs, although generated in the OCD context, are, in fact, transdiagnostic (Belloch et al., 2010; Fergus & Carmin, 2014). Although we have kept the label of ‘obsessive-related beliefs’, as this is how they are presented in the literature, it could be changed to ‘general dysfunctional beliefs’.

Fifth, HeOr has been used in the present research largely as the ‘minor’ element of orthorexia, as the main focus was on dysfunctional beliefs and the pathological side of orthorexia. It would be possible to question the inclusion of HeOr in our survey. We acknowledge that the main focus in the area of orthorexias has mainly been OrNe, even when using the TOS. This is probably due to the background of most of the researchers in this area: psychopathology and eating disorders. This minor relevance of HeOr is also visible in the low priority that has been given in this area to the construction of models of healthy eating, although with some notable exceptions (e.g., Greville-Harris et al., 2022). From another point of view, we consider that if HeOr had not been incorporated into the current research we would have missed some important results. For instance, Overvaluation of Healthy Eating is associated with OrNe, both in correlation and regression analysis, but it is relevant that it is clearly more connected to HeOr.

Future lines of research should try, first of all, to replicate these findings. In our sample the mean OrNe score was 3.8, that is, the majority of the participants presented very low scores on this dimension. Although currently it is not possible to conduct large-scale research with people with a formal diagnosis of OrNe, it would be informative to recruit samples from populations known for their higher OrNe scores. Given the similarities between OrNe and the construct measured by the EAT Diet factor, it is mandatory to solve which differences can be established between them. To do so, multidimensional models of restraint should be incorporated (Hagan et al., 2017) similar to how a bidimensional model of orthorexia has proven useful in this field. Longitudinal studies in which casual inferences could be established are greatly needed.

6. Conclusions

Despite these limitations, this study is especially relevant given that it represents the first attempt to analyze the specific dysfunctional beliefs associated with orthorexia, and has resulted in a scale to evaluate dysfunctional beliefs related to healthy eating that elucidates some important aspects of OrNe and HeOr. Specifically, this new measure has pointed out the relevance of the Need to Control construct for OrNe, which could be one of the main pillars of the relationship between OrNe and ED, as well as OCD. In contrast, the results suggest that the Overvaluation of Healthy Eating factor is the most relevant for HeOr. In turn, this result again shows a different pattern of associations for OrNe and HeOr. Previous results have pointed out that the healthiness of food choices is not the motive most closely associated with OrNe (Depa et al., 2019; Hanras et al., 2024), and in the present study we have found that the Overvaluation of Healthy Eating is not the belief most closely related to OrNe. These results are intriguing, as they open up the question about what the core elements of OrNe are. We can indicate that fear of control about eating seems to be among them. This also indicates that those beliefs about control may be key aspects for clinical practice.

The OCCWG (2003) stated that “[a]ny new scientific approach to a psychological disorder requires that the key concepts and processes implicated in that perspective must be clearly articulated and amenable to measurement and experimentation” (page 864). Borrowing those ideas from the area of OCD, and given how the area of beliefs has shed light on several areas of psychopathology, we have developed an instrument intended to measure dysfunctional beliefs related to healthy eating.

CRediT authorship contribution statement

María Roncero: Writing – review & editing, Writing – original draft, Supervision, Project administration, Investigation, Funding acquisition, Conceptualization. **Juan Ramón Barrada:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Data curation. **Miriam Pitarch:** Writing – review & editing, Writing – original draft, Methodology. **Gemma García-Soriano:** Writing – review & editing, Writing – original draft, Conceptualization.

Ethical statement

This research was approved by the Ethics Committee of the University of Valencia (code UV-INV_ETICA-1533796).

Declaration of competing interest

None.

Acknowledgements

This study was supported by the Conselleria d’Innovació, Universitat, Ciència i Societat Digital, Generalitat Valenciana (GV/2021/162). Funding source had no involvement in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.appet.2025.107975>.

Data availability

The open database and code files for these analyses are available at the Open Science Framework repository (<https://osf.io/daxkw/>)

References

- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed.). Text Revision: Author.
- Anastasiades, E., & Argyrides, M. (2023). Exploring the role of positive body image in healthy orthorexia and orthorexia nervosa: A gender comparison. *Appetite*, 185, Article 106523. <https://doi.org/10.1016/j.appet.2023.106523>
- Asparouhov, T., & Muthén, B. (2009). Exploratory structural equation modeling. *Structural Equation Modeling*, 16, 397–438. <https://doi.org/10.1080/10705510903008204>
- Atchison, A. E., & Zickgraf, H. F. (2022). Orthorexia nervosa and eating disorder behaviors: A systematic review of the literature. *Appetite*, 177, Article 106134. <https://doi.org/10.1016/j.appet.2022.106134>
- Barrada, J. R., & Meule, A. (2024). Orthorexia nervosa: Research based on invalid measures is invalid. *Journal of Global Health*, 14, Article 03007. <https://doi.org/10.7189/jogh.14.03007>
- Barrada, J. R., & Roncero, M. (2018). Bidimensional structure of the orthorexia: Development and initial validation of a new instrument. *Anales de Psicología*, 34, 283–291. <https://doi.org/10.6018/analesps.34.2.299671>
- Barthels, F., Barrada, J. R., & Roncero, M. (2019). Orthorexia nervosa and healthy orthorexia as new eating styles. *PLoS One*, 14(7), Article e0219609. <https://doi.org/10.1371/journal.pone.0219609>
- Beck, A. T., & Haigh, E. A. P. (2014). Advances in cognitive theory and therapy: The generic cognitive model. *Annual Review of Clinical Psychology*, 10(1), 1–24. <https://doi.org/10.1146/annurev-clinpsy-032813-153734>
- Belloch, A., Morillo, C., Luciano, J. V., García-Soriano, G., Cabedo, E., & Carrió, C. (2010). Dysfunctional belief domains related to obsessive-compulsive disorder: A further examination of their dimensionality and specificity. *Spanish Journal of Psychology*, 13(1), 376–388. <https://doi.org/10.1017/s1138741600003930>
- Bhattacharya, A., Cooper, M., McAdams, C., Peebles, R., & Timko, C. A. (2022). Cultural shifts in the symptoms of anorexia nervosa: The case of orthorexia nervosa. *Appetite*, 170, Article 105869. <https://doi.org/10.1016/j.appet.2021.105869>
- Brown, M., Robinson, L., Campione, G. C., Wuensch, K., Hildebrandt, T., & Micali, N. (2017). Intolerance of uncertainty in eating disorders: A systematic review and meta-analysis. *European Eating Disorders Review*, 25(5), 329–343. <https://doi.org/10.1002/erv.2523>
- Brytek-Matera, A., Pardini, S., Modrzejewska, J., Modrzejewska, A., Szymańska, P., Czepczor-Bernat, K., & Novara, C. (2022). Orthorexia nervosa and its association with obsessive-compulsive disorder symptoms: Initial cross-cultural comparison between Polish and Italian university students. *Eating and Weight Disorders*, 27(3), 913–927. <https://doi.org/10.1007/s40519-021-01228-y>
- Castro, J., Toro, J., Salamero, M., & Guimerá, E. (1991). The eating attitudes test: Validation of the Spanish version. *Evaluación Psicológica*, 7(2), 175–189.
- Cena, H., Barthels, F., Cuzzolaro, M., Bratman, S., Brytek-Matera, A., Dunn, T., Varga, M., Missbach, B., & Donini, L. M. (2019). Definition and diagnostic criteria for orthorexia nervosa: A narrative review of the literature. *Eating and Weight Disorders*, 24, 209–246. <https://doi.org/10.1007/s40519-018-0606-y>
- Chace, S., & Kluck, A. S. (2022). Validation of the Teruel Orthorexia Scale and relationship to health anxiety in a U.S. sample. *Eating and Weight Disorders*, 27(4), 1437–1447. <https://doi.org/10.1007/s40519-021-01272-8>
- Chan, E., & Zhang, L. S. (2022). Is this food healthy? The impact of lay beliefs and contextual cues on food healthiness perception and consumption. *Current Opinion in Psychology*, 46, Article 101348. <https://doi.org/10.1016/j.copsyc.2022.101348>
- Cheshire, A., Berry, M., & Fixsen, A. (2020). What are the key features of orthorexia nervosa and influences on its development? A qualitative investigation. *Appetite*, 155, Article 104798. <https://doi.org/10.1016/j.appet.2020.104798>
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7(3), 309–319. <https://doi.org/10.1037/1040-3590.7.3.309>
- Dell’Osso, L., Abelli, M., Carpita, B., Pini, S., Castellini, G., Carmassi, C., & Ricca, V. (2016). Historical evolution of the concept of anorexia nervosa and relationships with orthorexia nervosa, autism, and obsessive-compulsive spectrum. *Neuropsychiatric Disease and Treatment*, 12, 1651–1660. <https://doi.org/10.2147/NDT.S108912>
- Depa, J., Barrada, J. R., & Roncero, M. (2019). Are the motives for food choices different in orthorexia nervosa and healthy orthorexia? *Nutrients*, 11, 697. <https://doi.org/10.3390/nu11030697>
- Domingues, R. B., & Carmo, C. (2020). Orthorexia nervosa in yoga practitioners: Relationship with personality, attitudes about appearance, and yoga engagement. *Eating and Weight Disorders*. <https://doi.org/10.1007/s40519-020-00911-w>
- Donini, L. M., Barrada, J. R., Barthels, F., Dunn, T. M., Babeau, C., Brytek-Matera, A., Cena, H., Cerolini, S., Cho, H., Coimbra, M., Cuzzolaro, M., Ferreira, C., Galfano, V., Grammatikopoulou, M. G., Hallit, S., Håman, L., Hay, P., Jimbo, M., Lason, C., ... Lombardo, C. (2022). A consensus document on definition and diagnostic criteria for orthorexia nervosa. *Eating and Weight Disorders*, 27(8), 3695–3711. <https://doi.org/10.1007/s40519-022-01512-5>
- Fairburn, C. G., Shafran, R., & Cooper, Z. (1999). A cognitive behavioural theory of anorexia nervosa. *Behaviour Research and Therapy*, 37(1), 1–13. [https://doi.org/10.1016/s0005-7967\(98\)00102-8](https://doi.org/10.1016/s0005-7967(98)00102-8)
- Falgaes, G., Costanzo, G., Manna, G., Marchetti, D., Barrada, J. R., Roncero, M., Verrocchio, M. C., & Ingoglia, S. (2023). Healthy orthorexia vs. orthorexia nervosa: Italian validation of the Teruel orthorexia scale (TOS). *Eating and Weight Disorders*, 28(1), 42. <https://doi.org/10.1007/s40519-023-01568-x>
- Fergus, T. A., & Carmin, C. N. (2014). The validity and specificity of the short-form of the Obsessive Beliefs Questionnaire (OBQ). *Journal of Psychopathology and Behavioral Assessment*, 36(2), 318–328. <https://doi.org/10.1007/s10862-013-9398-6>

- Foa, E. B., Huppert, J. D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G., & Salkovskis, P. M. (2002). The Obsessive-Compulsive Inventory: Development and validation of a short version. *Psychological Assessment*, 14(4), 485–496. <https://doi.org/10.1037/1040-3590.14.4.485>
- Fullana, M. A., Tortella-Feliu, M., Caseras, X., Andión, Ó., Torrubia, R., & Mataix-Cols, D. (2005). Psychometric properties of the Spanish version of the obsessive-compulsive inventory—revised in a non-clinical sample. *Journal of Anxiety Disorders*, 19(8), 893–903. <https://doi.org/10.1016/j.janxdis.2004.10.004>
- Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The eating attitudes test: Psychometric features and clinical correlates. *Psychological Medicine*, 12, 871. <https://doi.org/10.1017/S0033291700049163>
- Garrido, L. E., Abad, F. J., & Ponsoda, V. (2013). A new look at Horn's parallel analysis with ordinal variables. *Psychological Methods*, 18, 454–474. <https://doi.org/10.1037/a0030005>
- Gentes, E. L., & Ruscio, A. M. (2011). A meta-analysis of the relation of intolerance of uncertainty to symptoms of generalized anxiety disorder, major depressive disorder, and obsessive-compulsive disorder. *Clinical Psychology Review*, 31(6), 923–933. <https://doi.org/10.1016/j.cpr.2011.05.001>
- Greville-Harris, M., Smithson, J., & Karl, A. (2020). What are people's experiences of orthorexia nervosa? A qualitative study of online blogs. *Eating and Weight Disorders*, 25(6), 1693–1702. <https://doi.org/10.1007/s40519-019-00809-2>
- Greville-Harris, M., Talbot, C. V., Moseley, R. L., & Vuillier, L. (2022). Conceptualisations of health in orthorexia nervosa: A mixed-methods study. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, 27(8), 3135–3143. <https://doi.org/10.1007/s40519-022-01443-1>
- Hagan, K. E., Forbush, K. T., & Chen, P.-Y. (2017). Is dietary restraint a unitary or multifaceted construct? *Psychological Assessment*, 29(10), 1249–1260. <https://doi.org/10.1037/pas0000429>
- Halim, M. Z., Dickinson, K. M., Kemps, E., & Prichard, I. (2020). Orthorexia nervosa: Examining the Eating Habits Questionnaire's reliability and validity, and its links to dietary adequacy among adult women. *Public Health Nutrition*, 23(10), 1684–1692. <https://doi.org/10.1017/S1368980019004282>
- Hallit, S., Barrada, J. R., Salameh, P., Sacre, H., Roncero, M., & Obeid, S. (2021). The relation of orthorexia with lifestyle habits: Arabic versions of the eating habits questionnaire and the dusseldorf orthorexia scale. *Journal of Eating Disorders*, 9(1), 102. <https://doi.org/10.1186/s40337-021-00455-z>
- Hanganu-Bresch, C. (2020). Orthorexia: Eating right in the context of healthism. *Medical Humanities*, 46(3), 311–322. <https://doi.org/10.1136/medhum-2019-011681>
- Hanras, E., Boujut, E., Barrada, J. R., & Dorard, G. (2024). Differentiating healthy orthorexia from orthorexia nervosa: Sociodemographic, psychological and dietary characteristics in a French sample. *Public Health Nutrition*, 27, e255. <https://doi.org/10.1017/S1368980024002374>
- Hellberg, S. N., Buchholz, J. L., Twhog, M. P., & Abramowitz, J. S. (2020). Not just thinking, but believing: Obsessive beliefs and domains of cognitive fusion in the prediction of OCD symptom dimensions. *Clinical Psychology & Psychotherapy*, 27(1), 69–78. <https://doi.org/10.1002/cpp.2409>
- Hittner, J. B., May, K., & Silver, N. C. (2003). A Monte Carlo evaluation of Tests for comparing dependent correlations. *The Journal of General Psychology*, 130(2), 149–168. <https://doi.org/10.1080/00221300309601282>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55. <https://doi.org/10.1080/10705519909540118>
- Humphreys, J. D., Clopton, J. R., & Reich, D. A. (2007). Disordered eating behavior and obsessive compulsive symptoms in college students: Cognitive and affective similarities. *Eating Disorders*, 15(3), 247–259. <https://doi.org/10.1080/10640260701323508>
- Huynh, P. A., Miles, S., De Boer, K., Meyer, D., & Nedeljkovic, M. (2024). A systematic review and meta-analysis of the relationship between obsessive-compulsive symptoms and symptoms of proposed orthorexia nervosa: The contribution of assessments. *European Eating Disorders Review*, 32(2), 257–280. <https://doi.org/10.1002/erv.3041>
- Lasson, C., Rousseau, A., Vicente, S., Goutaudier, N., Romo, L., Roncero, M., & Barrada, J. R. (2023). Orthorexic eating behaviors are not all pathological: A French validation of the Teruel orthorexia scale (TOS). *Journal of Eating Disorders*, 11(1), 65. <https://doi.org/10.1186/s40337-023-00764-5>
- Lavender, A., Shubert, I., De Silva, P., & Treasure, J. (2006). Obsessive-compulsive beliefs and magical ideation in eating disorders. *British Journal of Clinical Psychology*, 45(3), 331–342. <https://doi.org/10.1348/014466505x53579>
- Lilenfeld, L. R. R., Wonderlich, S., Riso, L. P., Crosby, R., & Mitchell, J. (2006). Eating disorders and personality: A methodological and empirical review. *Clinical Psychology Review*, 26(3), 299–320. <https://doi.org/10.1016/j.cpr.2005.10.003>
- Maïano, C., Aimé, A., Almenara, C. A., Gagnon, C., & Barrada, J. R. (2022). Psychometric properties of the Teruel Orthorexia Scale (TOS) among a French-Canadian adult sample. *Eating and Weight Disorders*, 27(8), 3457–3467. <https://doi.org/10.1007/s40519-022-01482-8>
- Marsh, H. W., Hau, K.-T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, 11, 320–341. https://doi.org/10.1207/s15328007sem1103_2
- McComb, S. E., & Mills, J. S. (2019). Orthorexia nervosa: A review of psychosocial risk factors. *Appetite*, 140, 50–75. <https://doi.org/10.1016/j.appet.2019.05.005>
- McDonald, A., & Braun, V. (2022). Right, yet impossible? Constructions of healthy eating. *SSM - Qualitative Research in Health*, 2, Article 100100. <https://doi.org/10.1016/j.ssmqr.2022.100100>
- McEvoy, P. M., Hyett, M. P., Shihata, S., Price, J. E., & Strachan, L. (2019). The impact of methodological and measurement factors on transdiagnostic associations with intolerance of uncertainty: A meta-analysis. *Clinical Psychology Review*, 73, Article 101778. <https://doi.org/10.1016/j.cpr.2019.101778>
- Ng, Q. X., Lee, D. Y. X., Yau, C. E., Han, M. X., Liew, J. J. L., Teoh, S. E., Ong, C., Yaow, C. Y. L., & Chee, K. T. (2024). On orthorexia nervosa: A systematic review of reviews. *Psychopathology*, 57(4), 345–358. <https://doi.org/10.1159/000536379>
- Obsessive Compulsive Cognitions Working Group. (1997). Cognitive assessment of obsessive-compulsive disorder. *Behaviour Research and Therapy*, 35(7), 667–681. [https://doi.org/10.1016/s0005-7967\(97\)00017-x](https://doi.org/10.1016/s0005-7967(97)00017-x)
- Obsessive Compulsive Cognitions Working Group. (2001). Development and initial validation of the obsessive beliefs questionnaire and the interpretation of intrusions inventory. *Behaviour Research and Therapy*, 39(8), 987–1006. [https://doi.org/10.1016/s0005-7967\(00\)00085-1](https://doi.org/10.1016/s0005-7967(00)00085-1)
- Obsessive Compulsive Cognitions Working Group. (2003). Psychometric validation of the obsessive beliefs questionnaire and the interpretation of intrusions inventory: Part I. *Behaviour Research and Therapy*, 41(8), 863–878. [https://doi.org/10.1016/s0005-7967\(02\)00099-2](https://doi.org/10.1016/s0005-7967(02)00099-2)
- Palmieri, S., Mansueto, G., Ruggiero, G. M., Caselli, G., Sassaroli, S., & Spada, M. M. (2021). Metacognitive beliefs across eating disorders and eating behaviours: A systematic review. *Clinical Psychology & Psychotherapy*, 28(5), 1254–1265. <https://doi.org/10.1002/cpp.2573>
- Rachman, S. (1997). A cognitive theory of obsessions. *Behaviour Research and Therapy*, 35(9), 793–802. [https://doi.org/10.1016/s0005-7967\(97\)00040-5](https://doi.org/10.1016/s0005-7967(97)00040-5)
- Roncero, M., Barrada, J. R., García-Soriano, G., & Guillén, V. (2021). Personality profile in orthorexia nervosa and healthy orthorexia. *Frontiers in Psychology*, 12, Article 710604. <https://doi.org/10.3389/fpsyg.2021.710604>
- Roncero, M., Belloch, A., Perpiñá, C., & Treasure, J. (2013). Ego-syntonicity and ego-dystonicity of eating-related intrusive thoughts in patients with eating disorders. *Psychiatry Research*, 208(1), 67–73. <https://doi.org/10.1016/j.psychres.2013.01.006>
- Roncero, M., Perpiñá, C., & García-Soriano, G. (2011). Study of obsessive compulsive beliefs: Relationship with eating disorders. *Behavioural and Cognitive Psychotherapy*, 39(4), 457–470. <https://doi.org/10.1017/s1352465811000099>
- Salgado, J. F. (2017). Bandwidth-fidelity dilemma. In E. V. Zeigler-Hill, & T. K. Shackelford (Eds.), *Encyclopedia of personality and individual differences* (pp. 1–4). Springer International Publishing. https://doi.org/10.1007/978-3-319-28099-8_1280-1
- Salkovskis, P. M. (1985). Obsessional-compulsive problems: A cognitive-behavioural analysis. *Behaviour Research and Therapy*, 23(5), 571–583. [https://doi.org/10.1016/0005-7967\(85\)90105-6](https://doi.org/10.1016/0005-7967(85)90105-6)
- Sandín, B., Chorot, P., Lostao, L., Joiner, T. E., Santed, M. A., & Valiente, R. M. (1999). Escalas PANAS de afecto positivo y negativo: Validación factorial y convergencia transcultural [The PANAS Scales of Positive and Negative Affect: Factor analytic validation and cross-cultural convergence]. *Psicothema*, 11, 37–51.
- Shafraan, R., Teachman, B. A., Kerry, S., & Rachman, S. (1999). A cognitive distortion associated with eating disorders: Thought-shape fusion. *British Journal of Clinical Psychology*, 38(2), 167–179. <https://doi.org/10.1348/014466599162728>
- Slade, P. (1982). Towards a functional analysis of anorexia nervosa and bulimia nervosa. *British Journal of Clinical Psychology*, 21(3), 167–179. <https://doi.org/10.1111/j.2044-8260.1982.tb00549.x>
- Strahler, J. (2021). Trait mindfulness differentiates the interest in healthy diet from orthorexia nervosa. *Eating and Weight Disorders: EWD*, 26(3), 993–998. <https://doi.org/10.1007/s40519-020-00927-2>
- Strahler, J., Haddad, C., Salameh, P., Sacre, H., Obeid, S., & Hallit, S. (2020). Cross-cultural differences in orthorexic eating behaviors: Associations with personality traits. *Nutrition*, 77, Article 110811. <https://doi.org/10.1016/j.nut.2020.110811>
- Syurina, E. V., Bood, Z. M., Ryman, F. V. M., & Muftugil-Yalcin, S. (2018). Cultural phenomena believed to be associated with orthorexia nervosa – opinion study in Dutch health professionals. *Frontiers in Psychology*, 9. <https://doi.org/10.3389/fpsyg.2018.01419>
- Veale, D. (2002). Over-valued ideas: A conceptual analysis. *Behaviour Research and Therapy*, 40(4), 383–400. [https://doi.org/10.1016/S0005-7967\(01\)00016-X](https://doi.org/10.1016/S0005-7967(01)00016-X)
- Vuillier, L., Greville-Harris, M., & Moseley, R. L. (2025). The risk of believing that emotions are bad and uncontrollable: Association with orthorexia nervosa. *Eating and Weight Disorders*, 30(1), 8. <https://doi.org/10.1007/s40519-024-01710-3>
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54, 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- Xia, Y., & Yang, Y. (2019). RMSEA, CFI, and TLI in structural equation modeling with ordered categorical data: The story they tell depends on the estimation methods. *Behavior Research Methods*, 51, 409–428. <https://doi.org/10.3758/s13428-018-1055-2>
- Zickgraf, H. F., & Barrada, J. R. (2022). Orthorexia nervosa vs. healthy orthorexia: Relationships with disordered eating, eating behavior, and healthy lifestyle choices. *Eating and Weight Disorders*, 27, 1313–1325. <https://doi.org/10.1007/s40519-021-01263-9>