

Orthorexia Nervosa and Adaptation of ORTO-11 into Turkish

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Abstract

Objective: Orthorexia pathological fixation about the consumption of healthy food. The present study aimed to reveal the psychometric properties of the Turkish version of ORTO-15, which was developed to evaluate orthorexia, and to investigate the relationship between orthorexia, and eating attitude, obsessive-compulsive symptoms, and some demographic variables.

Method: The study included 994 participants aged between 19 and 66 years. ORTO-15, the Maudsley Obsessive-Compulsive Inventory, and the Eating Attitude Test-40 were administered to the participants.

Results: A 3-factor solution with varimax rotation explained 40.62% of the variance. When 4 items with factor loadings below ± 0.50 were eliminated from ORTO-15, the Cronbach's alpha coefficient was 0.62. The remaining 11 items were thought to have statistically satisfactory properties for the Turkish version of ORTO and were collectively referred to as ORTO-11. This version was used to investigate the relationship between orthorexia, and eating attitude and obsessive-compulsive symptoms. Pathological eating attitude and obsessive-compulsive symptoms were related to orthorexia. Women exhibited more orthorexic symptoms than men. In the present study high a body mass index was an important variable for orthorexia, but only together with gender (female), pathological eating attitude, and increased obsessive-compulsive symptoms. The results, implications, and limitations of the study are discussed.

Conclusion: ORTO-11 demonstrated statistically satisfactory properties. Orthorexia was related to pathological eating attitude and obsessive-compulsive symptoms; however, caution should be used when generalizing the reported results.

Key Words: Orthorexia nervosa, eating attitude

INTRODUCTION

Cultures, habits, life styles, and, thus, eating habits are rapidly changing. These rapid changes have stimulated research and debate concerning some previously unreported eating behavior patterns that might be regarded as pathological or related to other pathologies. Eating disorders have been known for many years, but anorexia nervosa (AN) and bulimia nervosa (BN) were included by the formal classification systems only recently (Andersen and Yager, 2005). Eating disorders were initially seen only in industrialized countries, but in recent years they have been increasingly observed in all cultures that are familiar with the Western image of the "ideal woman". All of this suggests that when diagnostic criteria for

a disorder previously not recognized by the classification systems are established, subsequent studies of that disorder improve our understanding of it.

As in the case with AN and BN, although orthorexia nervosa (ON) is not present in DSM, it is a new category on which researchers discuss whether it can be a disorder. Steven Bratman defined this concept for the first time in 1997. Ortho literally means straight or correct. Bratman used orthorexia nervosa to define a pathological fixation on the consumption of appropriate and healthy food (Mathieu, 2005). It is not an independent diagnostic category, but it has some similarities with other eating disorders. It can lead to malnutrition and weight loss as in AN. Unlike AN and BN, people

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with ON are preoccupied with consuming healthy and pure foods instead of the quantity of food or physical appearance. They might spend most of their time following strict rules and in a state of preoccupation with foods, behaviors that seem similar to obsessive-compulsive symptoms. As a result, their social functioning may be negatively affected. Nonetheless, some argue that the preoccupation with food in ON is not as distinctive as in AN and BN cases, as it is only related to the quality of the food; therefore, it should not be placed in a separate category (Strand, 2004). Healthy eating habits are actually not pathological; however, when a person is excessively preoccupied with consuming healthy food, spends an excessive amount of time with the preoccupation, and experiences dysfunction in daily life as a result, then it could be evaluated as a disorder that is linked to behavior and personality (Donini et al., 2004).

Orthorexia is a new concept and does not have a universally accepted definition or valid diagnostic criteria. As such, there is relatively little information available about orthorexia (Donini et al., 2004). Donini et al. (2004) investigated the prevalence rate of ON by studying 525 people in Italy, and provided suggestions for diagnostic criteria. Participants were evaluated in terms of their food selection behaviors, and obsessive-compulsive and phobic symptoms. In terms of food selection behavior, the upper 25% of the distribution of the sample were defined as health fanatics. MMPI was used to evaluate obsessive-compulsive symptoms. The researchers gave the diagnosis of ON to people that were in the upper 25% of the distribution in terms of healthy food selection behavior and who had MMPI scores above the cut-off point. People diagnosed with ON accounted for 6.9% of their entire sample. The prevalence rate was higher among men and low educated people compared to women and high education. In another study, Donini et al. (2005) evaluated the validity of ORTO-15, which was designed to measure ON. In addition, there was a case study on ON conducted in Spain (Zamora, Bonaechea, Sanchez, et al., 2005). In Turkey, Bosi et al. (2006) conducted a descriptive study of 318 people using ORTO-15. They accepted the cut-off point suggested by Donini et al. (2005) and found that 45.5% of their sample was excessively sensitive to their own eating habits. To date, the scale has not been adapted to Turkish nor has its psychometric properties been evaluated for use in the Turkish population.

Based on the limited findings published about ON, it does not appear to have valid diagnostic criteria. It might be a possible diagnostic category, or it might be

categorized under AN and BN. Orthorexic qualities can also be described as a "healthy nutrition" and accepted as healthy qualities. In this respect, it is important to clearly define ON and to delineate the similarities and differences between ON and other psychopathologies. Studies that measure ON in diverse cultures can also contribute to these aims. The present study aimed to adapt ORTO-15 for use in the Turkish population using a large sample. We investigated the relationship between orthorexia, and eating attitude, obsessive-compulsive symptoms, and some demographic variables.

METHOD

Sample

The study sample consisted of volunteers from the academic and administrative personnel of Hacettepe University. Statistical analysis was conducted on data collected from the instruments completed by the participants. Ninety-five percent of the participants fully provided the required information on the instruments. After data entry, the entire data set was examined and extreme values were eliminated from the analysis. In the end, our sample consisted of 578 female and 416 male participants (994 participants in total). Age range of the sample was 19-66 years (mean: 35.57 ± 9.43 years) and duration of education was 5-48 years (mean: 17.37 ± 5.31 years).

Instruments

ORTO-15

Donini et al. (2005) developed ORTO-15 based on a brief 10-item orthorexia questionnaire by Bratman (2000). They used some of the items from Bratman's questionnaire and added some new items to create ORTO-15. The original version of ORTO-15 was first developed in Italy. It is a 15-item self-report questionnaire that measures the tendency for orthorexia nervosa. Items assess an individual's behaviors related to the selection, purchase, preparation, and consumption of food that they regard as healthy.

Donini et al. (2005) aimed to develop items that would assess individuals in terms of emotional and rational aspects. For this reason, some items assessed the cognitive-rational domain (1, 5, 6, 11, 12, and 14), some the clinical domain (3, 7, 8, 9, and 15), and others the emotional domain (2, 4, 10, and 13). Each item was answered on a 4-point Likert scale. Individuals were required to answer with always, often, sometimes, or never,

Table I. Factor analysis results of ORTO-15.

Items	Factor 1 Emotion	Factor 2 Behaviour	Factor 3 Cognition
1. When eating, do you pay attention to the calories of the food?	-0.44		
3. In the last 3 months, did the thought of food worry you?	0.60		
4. Are your eating choices conditioned by your worry about your health status?	0.61		
9. Do you think your mood affects your eating behavior?	-0.45		
10. Do you think that the conviction to eat only healthy food increases self-esteem?	0.65		
11. Do you think that eating healthy food changes your life-style (frequency of eating out, friends, ...)?	0.52		
12. Do you think that consuming healthy food may improve your appearance?	0.65		
13. Do you feel guilty when transgressing?	0.65		
2. When you go in a food shop do you feel confused?		0.42	
5. Is the taste of food more important than the quality when you evaluate food?		-0.68	
8. Do you allow yourself any eating transgressions?		0.69	
6. Are you willing to spend more money to have healthier food?			0.53
7. Does the thought about food worry you for more than three hours a day?			-0.42
14. Do you think that on the market there is also unhealthy food?			0.59
15. At present, are you alone when having meals?			-0.44
Variation	20.79	10.60	9.23

to reflect how often they defined themselves with these expressions. Items that reflected an orthorexic tendency were scored as “1”, and items that reflected a tendency towards normal eating behavior were scored as “4”. Lower scores indicated an orthorexic inclination. Donini et al. (2005) found that when a score of 40 was taken as the cut-off point, the predictive validity of the scale was high and people with an orthorexic inclination could be discriminated. We could not find any additional studies that examined the psychometric properties of the scale.

The first and third authors of the present study translated ORTO-15 into Turkish. During the translation process the authors did not develop new expressions and adhered entirely to the original structure of the scale. This initial translation was independently evaluated against the original scale by a group of 5 professionals composed of nutritionists, clinical psychologists, and sociologists. This group attempted to arrive at the most effective and appropriate translations of the items that had

culturally equivalent meaning to the Turkish population. Moreover, professional translators and philologists examined the items to determine if they were comprehensible and made changes to clarify items when necessary. Then, we revised the items based on the suggestions of all these professionals. Three specialists conducted a back translation (from Turkish to English) and compared the back translation to the original scale. They found that the back translated English version and the original scale were very similar.

The Turkish version of the scale was then administered to 32 people that were not a part of our research sample. These 32 people evaluated the degree to which each item could be understood. We revised the items in accord with their feedback and then administered this revised version to 50 people and then to 200 people, all of who were not included in our research sample. We attempted to enhance the understandability of each item based on their feedback. Later, we conducted analyses on

Table II. Mean ORTO-11 scores and standard deviations of the groups that were categorized in terms of level of education, age, and gender.

Education	Mean (SD)
High school or less	26.81(4.93)
University	25.93(4.53)
Post-graduate	27.06(4.31)
Age (years)	
≤ 30	26.75(4.40)
30-45	26.70(4.52)
≤45	26.75(4.62)
Gender	
Female	26.12(4.33)
Male	27.56(4.58)

the psychometric properties of the scale and the findings are represented in the results section.

Maudsley Obsessive-Compulsive Inventory (MOCI)

MOCI is a self-report inventory that was developed by Hodgson and Rachman (1977) in order to assess the type and intensity of obsessive-compulsive symptoms. Higher scores indicate greater severity of obsessive-compulsive symptoms. Erol and Savaşır (1988) adopted MOCI into Turkish and conducted its reliability and validity analyses.

The Eating Attitude Test-40 (EAT-40)

Garner and Grafinkel (1979) developed EAT-40 in order to measure the eating behaviors and attitudes of anorectic patients, as well as possible problematic eating behaviors in normal individuals. Higher scores indicate problematic eating behaviors and attitudes. Savaşır and Erol (1989) conducted the reliability and validity study of the Turkish version of EAT-40.

Personal Information Form

Demographic information and data on height, weight, and ideal weight were collected with a personal information form. Moreover, individuals were asked whether they change their behavior when they utilize the information sources on nutrition and on healthy food.

PROCEDURE

The study protocol was approved by the Hacettepe University Faculty of Medicine Ethics Committee (regis-

tration number is LUT 05/100-4, 15.12.2005). Participants were required to read and sign an informed consent form. Then, the instruments were administered to the participants in random order to prevent any possible bias due to the order of administration.

Statistical analysis

We aimed to examine the structural properties of ORTO-15 and thus conducted principle components analysis and factor analysis with varimax rotation. We also computed Cronbach's alpha coefficients and item-total correlation coefficients.

Each continuous variable (age, level of education, obsessive-compulsive symptoms, eating attitude, and body mass index) was recoded into categorical variables with 3 levels, on which ANOVA was conducted. We utilized t-tests for two group comparison. Moreover, we conducted multivariate regression analysis.

We conducted ANOVA (3×3×3) to examine the effect of age, level of education, and gender on orthorexic tendency. Age was categorized into 3 levels: < 30 years, 30-45 years, and > 45 years. Level of education was categorized into 3 levels as well: high school and below, university, and post-graduate. One-way ANOVA was conducted to examine the effect of orthorexic tendency on eating attitude. For the eating attitude variable, we calculated cut-off scores for EAT-40 which correspond to the 33% and the 66% of the distribution. According to this computation, scores ≤ 11 represented the low-problematic group in terms of eating attitude, scores between 11 and 18 represented the moderate- group, and scores ≥ 19 represented the high-score group.

We conducted one-way ANOVA in order to examine the effect of obsessive-compulsive symptoms on orthorexic tendency. For obsessive-compulsive symptoms, we computed cut-off scores for MOCI, which corresponds to the 33% and 66% of the distribution of MOCI total score. According to this computation, scores ≤ 8 represented low obsessive-compulsive symptoms, scores between 9 and 15 represented moderate-level, and scores ≥ 16 represented high-levels of obsessive-compulsive symptoms. Body mass index had 3 levels: < 18.5, 18.5-25, and >25.

All continuous research variables and gender were treated as predictor variables for orthorexic tendency in multiple regression analysis. The significance level was accepted as P = 0.05 in all analyses.

Table III. Summary of the stepwise regression analysis of ORTO-11.

Hierarchical	Variable	β	t	R ²	SD	F change
1	Gender	0.160	5.083**	0.025	1.982	25.836**
2	Gender	0.160	5.094**			
	Education	0.097	3.102*	0.033	1.981	9.619*
3	Gender	0.110	3.626**			
	Education	0.034	1.095			
	Eating attitude	-0.300	-9.625**	0.116	1.980	92.632**
4	Gender	0.107	3.572**			
	Education	-0.009	-0.288			
	Eating attitude	-0.258	-8.106**			
	OCD	-0.167	-5.191**	0.139	1.979	26.946**
5	Gender	0.155	4.799**			
	Education	-0.013	-0.413			
	Eating attitude	-0.250	-7.906**			
	OCD	-0.173	-5.411**			
	BMI	-0.122	-3.833**	0.150	1.978	14.692**

*P < 0.01, **P < 0.001.

OCD: Obsessive-compulsive disorder. BMI: Body mass index.

RESULTS

Psychometric Properties of ORTO-15

Results of Factor Analyses

We conducted factor analyses to examine the factor structure of ORTO-15. Principle component analysis with varimax rotation indicated 4 factors with Eigenvalues >1.0. These 4 factors explained 47.87% of total variance. When we looked at the distribution of items in the factors, we observed that only 1 item loaded on the fourth factor. When the scree plot was examined, a 3-factor solution seemed adequate. Thus, analysis was repeated with 3-factor solution.

As seen in Table I, 3 factors explained 40.62% of the total variance. The factor loads ranged between -0.44 and 0.69. Items that were loaded on the first factor included worries and feelings about healthy nutrition, those loaded on the second factor involved behaviors related to the selection of food, and those loaded on the third factor were related to cognitions about nutrition. As such, the factors were respectively referred to as emotion, behavior, and cognition. The internal consistency

coefficients of these factors were, respectively, 0.14, 0.44, and 0.18.

We selected items with factor loadings ≥ 0.50 for the Turkish version of the scale. One reason was that we could not find any other study on the factor structure of the original scale and, therefore could not compare our results. Another reason was that, since orthorexia has been recently defined concept in the literature, we aimed to select as statistically powerful items as possible. We identified 11 such items, decided to include them in the scale and referred as ORTO-11. Items with numbers 3,4,5,6,7,8,10,11,12,13, and 14; were retained in the scale, only the item 8 was reversely coded.

We calculated Cronbach's alpha coefficients to check the internal consistency of the scale. The Cronbach's alpha coefficient was 0.44 for ORTO-15 and 0.62 for ORTO-11. We conducted another factor analysis with 11 items and identified 3 factors with Eigen values > 1.0. When we examined the factor structure, we observed that most of the items were loaded on factor 1 and only 2 items were loaded on both factor 2 and factor 3. Thus, the analysis was repeated with 2-factor solution. Eight

items loaded on the 1st factor and 3 items loaded on the 2nd factor. Factor 1 and factor 2 explained 24.94% and 12.25% of the total variance, respectively. Their Cronbach's alpha coefficients were, respectively, 0.70 and 0.31. The internal consistency coefficients of the factors of 11 item form were higher than those of the 15 items; however, the number of items and the internal consistency coefficient of the second factor were low. Thus, a single-factor structure was deemed appropriate for ORT-11. The item-total correlation of the items ranged between -0.5 and 0.49.

Conceptual properties of Orthorexia

Results of ANOVA

Orthorexia, Age, Level of Education, and Gender

We conducted ANOVA to examine the effect of age, level of education, and gender on orthorexic tendency. Age (3) \times level of education (3) \times gender (2) ANOVA indicated that there was a main effect of education [$F(2, 992) = 4.94$; $P < 0.01$, $\eta^2 = 0.010$] and gender [$F(1, 993) = 16.32$; $P < 0.001$, $\eta^2 = 0.016$] on orthorexic tendency. The main effect of age and interaction effects were not significant. Tukey's post hoc test indicated that a graduate/post-graduate-level of education group differed in terms of ORTO 11 score from the lower level groups. Mean ORTO-11 scores according to age, education, and gender are given in Table II.

As seen in Table II, the post-graduate education group had higher score on ORTO-11 and, thus, had less of an orthorexic tendency compared to the other education groups. Similarly, males had higher ORTO-11 scores and had lower orthorexic tendencies compared to females.

Orthorexia and Eating Attitude

Orthorexic tendency could be related to a pathological eating attitude and we therefore examined the relationship between ORTO-11 score and EAT-40 score. One-way ANOVA showed that eating attitude had a significant main effect on orthorexic tendency [$F(2, 993) = 48.04$; $P < 0.001$, $\eta^2 = 0.88$]. Tukey's test indicated that there were significant differences in terms of ORTO-11 scores of the three groups that were categorized according to EAT-40 score. Mean scores of individuals that were grouped based on EAT-40 score (from lower scorers to higher scorers) were, respectively, 28.22 ± 3.81 , 26.81 ± 4.43 , and 24.88 ± 4.63 . High EAT-40 scores represented pathological eating attitude and low ORTO-11 scores indicated orthorexic tendency. Thus,

those with a pathological eating attitude had a higher orthorexic tendency.

Orthorexia and Obsessive Compulsive Symptoms

We conducted one-way ANOVA with ORTO-11 and MOCI scores to examine the effect of obsessive-compulsive symptoms on orthorexic tendency. According to the ANOVA results, obsessive-compulsive symptoms had a significant main effect on orthorexic tendency [$F(2, 993) = 27.56$; $P < 0.001$, $\eta^2 = 0.053$]. Tukey's test indicated that the 3 groups that were categorized based on the intensity of obsessive-compulsive symptoms significantly differed from each other in terms of orthorexic tendency. Mean ORTO-11 score of the 3 obsessive-compulsive symptom groups (lower scorers to higher scorers) were, respectively, 27.95 ± 4.24 , 26.45 ± 4.50 , and 25.44 ± 4.40 . Individuals that had higher obsessive-compulsive symptoms had greater orthorexic tendencies.

Orthorexia and Body Mass Index (BMI)

We conducted ANOVA to examine the relationship between orthorexic tendency and BMI. We could not find any significant main effect of BMI on orthorexic tendency.

t-test Results

Orthorexia and Dieting

When we compared 63 people that had medically recurrent treatment for diet with the other participants, we observed that the former group could have a greater orthorexic tendency [$t(982) = 3.386$, $P < 0.001$]. Mean ORTO-11 score was 24.89 ± 4.6 for the group who were dieting and 26.85 ± 4.4 for the other participants.

Regression Analysis

We conducted stepwise multiple regression analysis in order to examine how demographic variables such as age, years of education, gender, eating attitude, obsessive-compulsive symptoms, and BMI predicted ORTO-11 score. Sociodemographic variables were entered in the first block; eating attitude (EAT-40 score), obsessive-compulsive symptoms (MOCI score), and BMI were entered in the second block. The summary of the regression analysis is given in Table III.

As seen in Table III, based on the regression analysis equation, gender, education, eating attitude, obsessive-

compulsive symptoms, and BMI explained 15% of total variance. First gender and years of education entered the equation. These variables were followed by eating attitude score. Although years of education had predictive value in the first block, when eating attitude, obsessive-compulsive symptoms, and BMI in the second block entered the equation the predictive value of education became non-significant. Age could not enter the equation. We observed that female gender, distorted eating attitude, increased obsessive-compulsive symptoms, and high BMI predicted orthorexic tendency.

DISCUSSION

Orthorexia nervosa is a newly defined and studied concept. It is marked by an excessive desire to consume pure and healthy foods, unlike other eating disorders in which a preoccupation with weight loss is observed. People can also be mentally and behaviorally preoccupied with the desire to consume healthy food, and in this respect ON is similar to obsessive-compulsive disorder (Donini et al., 2004; Strand, 2004). We observed that some patients with AN declined to eat food because they thought they should consume only healthy and necessary foods, rather than unhealthy and unnecessary foods. These patients had significant weight loss, amenorrhea, and limited dieting as seen in AN, but unlike AN their criteria for food selection was not based on calories. Their criteria for food selection were actually based on healthy versus unhealthy foods. They reported that they lost weight due to their effort to obtain healthy nutrition and they were preoccupied with their weight. Our limited clinical observations suggest that the number of people with an orthorexic tendency is increasing. Thus, we aimed to adapt ORTO-15 to Turkish and examine its psychometric properties. We investigated the relationship between orthorexia, and eating attitude, obsessive-compulsive symptoms, BMI, and such demographic variables as age, gender, and level of education.

The literature contained no detailed studies on the psychometric properties of ORTO-15. We sought to make a valid Turkish version of the scale without having the opportunity to compare our results with any other findings. When we removed some items from the scale (with factor loadings < 0.50), the internal consistency of the scale increased. Theoretically, for example, people with orthorexic tendencies could be expected to respond to item 2 (When you go into a store to buy food do you feel confused?) as “never”, because it was thought that these people have a firm idea of which foods should and

should not be eaten; however, the factor loading value of item 2 was low and the Cronbach's alpha coefficient of the scale rose when this item was deleted. This item seemed to not function well. Probably, those people with an orthorexic tendency were confused about which foods were the healthiest. When the statistical properties of the items were considered, the 11-item scale seemed, at least for our sample, to function better and; therefore, we referred to the scale as ORTO-11.

Results of factor analyses indicated that a single factor structure for ORTO-11 was more appropriate than a 2-factor solution, as there were few items loaded on the second factor and the internal consistency of the second factor was low. Although our study sample was large, adaption of scales should not be limited to one study; therefore, we recommend researchers include all 15 items, and conduct additional factor analyses of the scale in future studies. The functional items can only be determined after a sufficient accumulation of knowledge of the Turkish version of the scale, which might result in the revision of items, with increased item-total correlations.

After the investigation of psychometric properties of ORTO-11, we examined the relationships between gender, age, level of education, eating attitude, obsessive-compulsive symptoms, BMI, and dieting. It was found that gender was a powerful predictor of orthorexic tendency, and women had more orthorexic tendency than did men. Indeed, eating disorders are more prevalent in women than in men. For instance, in Turkey, Batigün, and Utku (2006) conducted a study on adolescents and reported that eating disorders are more widely seen among girls than boys. In this respect, the observed higher orthorexic tendency among the women was expected. Nevertheless, this finding is in contrast to that reported by Donini et al. (2004) from Italy; orthorexic tendency was more prevalent among men than women. This inconsistency might be rooted in cultural differences. As stated by Donini et al. (2004), in some cultures men have been influenced by “body culture” (paying attention to physical qualities and appearance due to social pressures) before women's influence. Selecting the healthiest foods might serve to satisfy their aesthetic concerns, where as men in Turkey might not have been influenced by this body culture yet, or, they might have developed behavioral patterns other than a preoccupation with “healthy nutrition” due to aesthetic concerns.

In the present study, ORTO-11 score was not related to age. ANOVA and regression results indicated that in Turkish culture age might not be an important variable

affecting orthorexic tendency; however, in an Italian sample, people that had an orthorexic tendency were older than those that did not (Donini et al., 2004).

In terms of education, ANOVA results contradicted those of regression analysis. One reason might be that level of education was related to other variables in the study; when level of education was evaluated along with other sociodemographic variables we observed that the higher education group had a statistically significantly lower orthorexic tendency. Yet, when level of education was evaluated along with eating attitude, obsessive-compulsive symptoms, and BMI, we did not observe any significant effect on orthorexic tendency. We thought that level of education was not a determining factor of orthorexic tendency.

We observed that people with a distorted eating attitude had lower ORTO-11 scores, which showed that they had a greater orthorexic tendency. Eating attitude was noted to be a good predictor of orthorexic tendency. This finding is in agreement with previous findings in the literature and points to the validity of the scale. Similarly, people that had higher obsessive-compulsive symptoms scored significantly lower on ORTO-11 and obsessive-compulsive symptoms were a significant predictor of orthorexic tendency. This finding agrees with the theoretical definition of orthorexia; however, Donini et al. (2005) reported that scores obtained from the scale were not significantly related to obsessive-compulsive scores obtained from MMPI. For this reason they suggested adding items that assess obsessive-compulsive behaviors to the scale.

In the present study we observed that as obsessive-compulsive symptoms changed, ORTO-11 scores also changed in the expected direction. One reason might be our alterations to ORTO-15. Another possible reason might be that Donini et al. (2005) measured obsessive-compulsive symptoms with MMPI, which measures anxiety in general, but usually cannot assess the presence of obsessive-compulsive symptoms. The present study utilized MOCI, which assesses only obsessive-compulsive symptoms. The main cause for the discrepancy between the findings of Donini et al. (2005) and our study is probably based on the different methods used to measure obsessive-compulsive symptoms.

We also examined the relationship between ORTO-11 score, and BMI and dieting. There was no significant effect of BMI on orthorexic tendency, which is in line with the findings of Donini et al. (2004). This finding indicated that orthorexia is different than eating disorders marked

by a low weight profile; however, higher BMI, along with eating attitude and obsessive-compulsive symptoms, can significantly predict orthorexic tendency. This showed that BMI could not predict orthorexic tendency by itself, but could predict it in combination with other variables. In the present study we observed that people that were dieting due to medical reasons had a greater orthorexic tendency, which indicated that sensitivity to dieting and healthy nutrition goes along with an orthorexic tendency.

In conclusion, we examined a newly studied concept – orthorexia – in a large sample and showed that orthorexia could be affected by a distorted eating attitude and obsessive-compulsive symptoms. Groups that differed in terms of BMI did not have differential orthorexic tendencies, but along with such variables as eating attitude and obsessive-compulsive symptoms, high BMI predicted orthorexic tendency. We could not find any other studies that examined the psychometric properties of the scale with as large a sample as used in the present study. Despite several strengths of our study, there are some unavoidable limitations. Firstly, external criteria for orthorexia could not be found in the literature because orthorexia is a newly defined concept. We utilized a newly developed scale that was based on some aspects of orthorexia and we investigated its relationship to theoretically related variables. These were major limitations of our study. Nevertheless, the lack of information should stimulate future research that contributes to the accumulation of knowledge. Moreover, further comprehensive studies of ORTO-11 are needed.

In future studies we recommend that researchers investigate whether ORTO-11 score can identify people that have clinical orthorexic symptoms. In this respect, interventions could be managed in accord with the identified symptoms. For example, for people with an orthorexic tendency, clinicians might target the desire to consume “pure healthy foods” instead of focusing on the desire to be thin. The treatment principles that were developed for well-known eating disorders could then be diversified in accord with the needs of the orthorexic population.

CONCLUSION

We demonstrated that orthorexic tendency was related to eating attitude and obsessive-compulsive symptoms. People that had a distorted eating attitude and higher obsessive-compulsive symptoms had a greater orthorexic tendency as BMI increased. Nevertheless, we should be cautious about generalizing the results related to ORTO-11 and orthorexia.

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