

1-1-2012

Orthorexia nervosa: Healthy eating or eating disorder?

Sonia Mahesh Shah

Eastern Illinois University

This research is a product of the graduate program in [Psychology](#) at Eastern Illinois University. [Find out more](#) about the program.

Recommended Citation

Shah, Sonia Mahesh, "Orthorexia nervosa: Healthy eating or eating disorder?" (2012). *Masters Theses*. 991.
<http://thekeep.eiu.edu/theses/991>

This Thesis is brought to you for free and open access by the Student Theses & Publications at The Keep. It has been accepted for inclusion in Masters Theses by an authorized administrator of The Keep. For more information, please contact tabruns@eiu.edu.

*******US Copyright Notice*******

No further reproduction or distribution of this copy is permitted by electronic transmission or any other means.

The user should review the copyright notice on the following scanned image(s) contained in the original work from which this electronic copy was made.

Section 108: United States Copyright Law

The copyright law of the United States [Title 17, United States Code] governs the making of photocopies or other reproductions of copyrighted materials.

Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the reproduction is not to be used for any purpose other than private study, scholarship, or research. If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that use may be liable for copyright infringement.

This institution reserves the right to refuse to accept a copying order if, in its judgment, fulfillment of the order would involve violation of copyright law. No further reproduction and distribution of this copy is permitted by transmission or any other means.

THESIS MAINTENANCE AND REPRODUCTION CERTIFICATE

TO: Graduate Degree Candidates (who have written formal theses)

SUBJECT: Permission to Reproduce Theses

An important part of Booth Library at Eastern Illinois University's ongoing mission is to preserve and provide access to works of scholarship. In order to further this goal, Booth Library makes all theses produced at Eastern Illinois University available for personal study, research, and other not-for-profit educational purposes. Under 17 U.S.C. § 108, the library may reproduce and distribute a copy without infringing on copyright; however, professional courtesy dictates that permission be requested from the author before doing so.

By signing this form:

- You confirm your authorship of the thesis.
- You retain the copyright and intellectual property rights associated with the original research, creative activity, and intellectual or artistic content of the thesis.
- You certify your compliance with federal copyright law (Title 17 of the U.S. Code) and your right to authorize reproduction and distribution of all copyrighted material included in your thesis.
- You grant Booth Library the non-exclusive, perpetual right to make copies of your thesis, freely and publicly available without restriction, by means of any current or successive technology, including but not limited to photocopying, microfilm, digitization, or Internet.
- You acknowledge that by depositing your thesis with Booth Library, your work is available for viewing by the public and may be borrowed through the library's circulation and interlibrary department or accessed electronically.
- You waive the confidentiality provisions of the Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) with respect to the contents of the thesis, including your name and status as a student at Eastern Illinois University.

Petition to Delay:

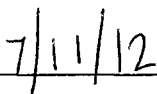
I respectfully petition that Booth Library delay maintenance and reproduction of my thesis until the date specified and for the reasons below. I understand that my degree will not be conferred until the thesis is available for maintenance and reproduction.

Date:

Reasons:



Author's Signature



Date

This form must be submitted in duplicate.

Orthorexia Nervosa: Healthy Eating or Eating Disorder?

(TITLE)

BY

Sonia Mahesh Shah

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

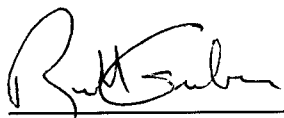
Master of Arts in Clinical Psychology

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2012

YEAR

I HEREBY RECOMMEND THAT THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

 7-12-12

THESIS COMMITTEE CHAIR DATE

 7/12/12

DEPARTMENT/SCHOOL CHAIR DATE
OR CHAIR'S DESIGNEE

 7/12/12

THESIS COMMITTEE MEMBER DATE

THESIS COMMITTEE MEMBER DATE

 7/12/2012

THESIS COMMITTEE MEMBER DATE

THESIS COMMITTEE MEMBER DATE

Orthorexia Nervosa: Healthy Eating or Eating Disorder?

Clinical Psychology Master's Thesis 2012

Sonia M. Shah

Eastern Illinois University

TABLE OF CONTENTS

ABSTRACT.....	4
ACKNOWLEDGEMENTS.....	5
CHAPTER	
1. INTRODUCTION.....	6
2. LITERATURE REVIEW.....	7
Measuring Orthorexia Nervosa.....	8
Prevalence of Orthorexia Nervosa.....	10
Eating Disorders and Orthorexia Nervosa.....	16
Anxiety and Orthorexia Nervosa.....	20
Quality of Life and Orthorexia Nervosa.....	22
Investigative Hypotheses.....	24
3. METHODOLOGY.....	26
Participants and Procedure.....	26
Measures.....	27
4. RESULTS.....	30
Analysis of Hypotheses.....	37
5. DISCUSSION.....	39
Limitations and Future Recommendations.....	44
6. CONCLUSION.....	47
APPENDICES.....	49
A. Bratman's Self-Test.....	49
B. Donini's ORTO-15.....	50

C. Consent Form and Demographic Questionnaire.....51

D. Body Mass Index Chart.....54

REFERENCES.....55

ABSTRACT

A new concept called orthorexia nervosa has recently become more prevalent in scientific journal articles. Orthorexia nervosa has been defined as a fixation on eating only healthy foods, spending hours ruminating on meals, and an obsession with proper nutrition (Bratman, 1997). Several studies have attempted to investigate this concept, establish prevalence rates, and determine whether orthorexia is a disorder. Some studies have found an association between eating disorders, anxiety, and orthorexia as well as posited risk factors such as higher body-mass index, level of education, and sex. The present study examined an individual's scores on measures of orthorexia, anxiety, eating disorders, obsessive-compulsive disorder, and satisfaction with life, in an American college sample. It was hypothesized that orthorexia would positively correlate with anxiety and OCD, have a negative association with eating disorders, be more prevalent in men, and that lower body-mass index would have a positive association with quality of life. The results of the study indicated that there is not an association between anxiety, OCD, and orthorexia, but that there is a positive association with symptoms of orthorexia and disordered eating. The findings also indicate that there is a positive correlation between low BMI and higher quality of life, and that there is no difference in the number of orthorexia symptoms endorsed by men or women.

ACKNOWLEDGEMENTS

I would like to thank my advisor, Dr. Russell Gruber, who took a chance on an unknown topic and provided invaluable feedback, assistance, and a sense of humor. Thanks also to my committee members Dr. Anu Sharma and Dr. John Best, whose advising and guidance were instrumental to the completion of my thesis. I truly appreciate the time and effort they spent to help me with my research.

I also want to thank my wonderful family, especially my mom, Neena Kasturi, who always supports and encourages me in all of my endeavors. Thank you for taking an interest in everything I do, and thank you for always putting things into perspective for me. Finally, I want to thank Raine Mackey for being my personal proofreader and for consistently working to cheer me up and cheer me on throughout this process.

Introduction

Over the course of the past several decades, many diet and exercise trends have become popular in American society. Along with the rise in the number of individuals who participate in these trends, other issues such as the obesity epidemic, an increase in eating disorders, and a healthcare crisis have become more prevalent in today's society. According to Michael Pollan's book The Omnivore's Dilemma (2006), the abundance of food in America exacerbates the poor choices made and has resulted in a "national eating disorder." It is this abundance that contributes to the obesity epidemic in the United States; 68% of Americans are overweight, and 33.8% of Americans are obese (NIH, 2010). Additionally, a report issued today by the Organization for Economic Cooperation and Development (OECD, 2012) predicts that close to 75 percent of Americans will be considered overweight or obese by 2020, the highest predicted rate of any country. Considering the abundance of food and the numbers of obese and overweight Americans, it is surprising to note that many Americans are malnourished. More than 49 million individuals in the United States experienced food insecurity (a household's physical and economic access to sufficient, safe, and nutritious food that fulfills the dietary needs and food preferences of that household for living an active and healthy life) in 2008 (FAO Agricultural and Development Economics Division, 2006; Holben, 2010). This inadequate intake of key nutrients is associated with poor health, increased risk for development of chronic disease, and poor psychological and cognitive functioning (Holben, 2010).

Perhaps in response to these various issues, the idea of healing through nutrition has become increasingly popular, and an emphasis is being placed on eating whole foods,

organic foods, and hormone- and antibiotic-free meat and dairy. However, some clinicians and researchers believe that when otherwise healthy behaviors and eating habits are taken to extremes, many problems can arise. Over the past decade, the scientific community, the media, doctors, nutritionists, and psychologists have hypothesized that a new disordered form of eating exists that is not yet recognized as an official disorder by psychological professionals. Orthorexia nervosa, a term coined by medical doctor Steven Bratman in 1997, originates from “*orthos*” which means right or correct in Latin, and “*orexis*” which means hunger or eating (Bratman, 1997). Bratman’s description of orthorexia nervosa (ON) as a “fixation on eating only healthy food” (p. 10), spending hours ruminating about past and future meals, and an obsession with proper nutrition, appears to be the only working definition of ON and is cited by all other articles on orthorexia.

Literature Review

Despite years of anecdotal evidence, the studies on orthorexia nervosa are sparse. All studies published in scientific journals were conducted in countries other than the United States, with one study conducted in the United States as a dissertation. The disproportionate interest in the topic of orthorexia by researchers in other countries raises questions about the health behaviors of Americans compared to other countries. If the concept of orthorexia was developed in the United States by an American doctor, why has there been significantly more interest in the topic from researchers in Europe rather than in America? There are many culture-specific disorders, and perhaps orthorexia nervosa is one of them. Many existing studies are conducted on specific groups of participants: medical students, dietetic students, dancers, and athletes, for example

(Aksoydan & Camci, 2009; Bosi, 2007; Eriksson et al, 2008). Although these populations have a higher risk for developing eating disorders (Kinzl et al., 1999; Ravaldi, 2006; Sundgot-Borgen & Torstveit, 2004), it is also important to include other populations to gain valuable demographic data on individuals with symptoms of orthorexia—especially when testing whether orthorexia is an eating disorder or whether a relationship between eating disorders and orthorexia exists. Some studies also lack a control group or other important variables. Additionally, the majority of studies do not aim to investigate similar hypotheses, so comparing the results of the studies is difficult.

Thus far, very preliminary and disparate data on the prevalence rate and basic demographic features of orthorexia nervosa is available. Some studies have also considered the relationship between orthorexia nervosa and existing eating disorders, anxiety, and obsessive-compulsive disorder. Consequences of orthorexia nervosa to an individual's quality of life have been reported mostly anecdotally, and there are no laboratory studies related to physiological effects of engaging in orthorexia.

Measuring Orthorexia Nervosa

The original scale devised to measure orthorexia was developed by Bratman (1997) and is published in his book, Health Food Junkies. Bratman is a physician who currently practices alternative medicine in Colorado. His test is a “self-test” (Bratman, p. 47). The scale consists of ten dichotomous yes-or-no questions. On his scale, each “yes” answer receives one point. A score of two or three means an individual has at least a “touch of orthorexia” (Bratman, 2000), though there is no further elaboration on what this statement means. A score of four or more means an individual does have orthorexia. A few of the questions are: Do you care more about the virtue of what you eat than the

pleasure you receive from eating it?, Do you feel guilt or self-loathing when you stray from your diet?, and do you plan tomorrow's food today? Bratman's scale in its entirety is located in Appendix A.

A majority of the questions in Bratman's test are very subjective and phrased in a way that may shape the test-taker's answers. The wording, format, and context of each question may also be interpreted differently by different test takers. The main issue when taking a self-test is whether a respondent's understanding of the question matches what the researcher had in mind (Schwartz, 1999). The first question of Bratman's test: "Do you spend more than three hours a day thinking about healthy food?" appears to be straightforward. However, it is possible that the term "healthy" can mean something different to each test taker. Also, while a test taker may understand the meaning or definition of a word, simply understanding is not sufficient. The terms "guilt" and "self-loathing" may carry different meanings for different individuals, despite agreement over the word's definition. In addition to these shortcomings, there are no known psychometric properties for this self-test.

Despite these critiques, a few studies have translated Bratman's questionnaire into different languages for use in studies (Kinzl et al., 2006; Korinth et al., 2009). Donini and colleagues (2004) developed their own questionnaire to diagnose orthorexia with an attempt to measure the phenomenon (2005). They used Bratman's (1997) scale as a model for their ORTO-15. Donini and colleagues considered that in the Italian culture, questions are rarely answered in a dichotomous fashion. They modified Bratman's test, added five questions of their own, and composed their questions on a 4-point Likert scale with "Always," "Often," "Sometimes," and "Never" as possible responses. In order to

score the ORTO-15, a key is provided in which certain responses are given one, two, or three points. The points are tallied for a total score. A lower score indicates more symptoms of orthorexia nervosa, and the suggested cutoff is 40. In a subsequent study (2005), Donini considered whether 35 could be considered a cutoff, but it rendered the measure invalid. At a threshold value of 35, had a sensitivity and positive predictive value of 0% (Donini, 2005). Some of Donini's (2004) test questions include: When eating, do you pay attention to the calories of food?, In the last 3 months, did the thought of food worry you?, Does the thought of food worry you for more than three hours a day?, and Do you think that eating healthy food changes your life-style (frequency of eating out, friends...)? The full measure is reproduced in Appendix B.

A few studies have used Donini's (2004) ORTO-15 to research orthorexia in various populations (Arusoglu et al., 2008; Bosi et al., 2007). All studies that have attempted to diagnose orthorexia have used other scales in conjunction with an orthorexia scale. However, as there is such limited research using the ORTHO-15, and there are no replication studies, it is unclear whether the scale can be considered to be reliable or valid. Still, results from the studies that do exist—none from the United States—clearly show that there is a relationship between patterns of eating and scores on the ORTHO-15.

Prevalence of Orthorexia Nervosa

Few efforts have been made to establish the prevalence of orthorexia nervosa, and none of these efforts occurred in America. Donini and colleagues (2004) conducted the first known empirical study attempting to measure the phenomenon of orthorexia nervosa. The aim of their study was a tentative proposal for the diagnosis of orthorexia and the verification of its prevalence. The study was conducted at The Institute of Food Sciences

in Rome, Italy on a group of 404 volunteers from various occupations. 236 of the volunteers were female, and 168 were male. The authors noted that participants under the age of sixteen were excluded because they were considered insufficiently autonomous in the choice of their food. However, nowhere in the article were the ages of other participants noted, so the meanings of the findings are difficult to determine. The results indicate that out of all participants, 28 (6.9%) were classified as “suffering from orthorexia,” 64 (15.8%) had normal eating behavior but altered MMPI scores such as elevated scale seven (e.g., OCD traits), and 69 (17.1%) had “health fanatic” eating behaviors but a normal MMPI. The term “health fanatic” was derived from results on a test in which participants rated foods as being healthy or unhealthy. The remaining subjects had normal eating patterns and a normal MMPI. Though the findings from this study indicate that orthorexic subjects have slightly higher ages (though this was not statistically significant) and that the prevalence of orthorexia is higher in males, there was no difference noted between orthorexic subjects and the rest of the study group as to body mass index, marital status, presence of children in the family, profession, or preferred source of food information. An inverse relationship between education level and orthorexia symptoms was also revealed, with individuals who had a lower level of education being more likely to exhibit symptoms of orthorexia. As validated criteria did not exist for the diagnosis of orthorexia, the findings cannot be corroborated by any other study.

Another effort to establish the prevalence of orthorexia was made by Bosi and colleagues (2007). They evaluated the potential symptoms of orthorexia nervosa in 318 Turkish medical residents (*M* age = 27.2 years). A total of 149 females and 169 males

were evaluated. The findings from their study indicate that 45.5% of the research group have orthorexia or at least “highly sensitive behavior” about eating habits. Finally, this study did not find a significant relationship between orthorexia and age. Another study on Turkish medical students was conducted on the prevalence of orthorexia, and similar results to Bosi’s study were reported. Fidan and colleagues (2009) sampled 879 medical students, about half female (M age = 21.3 years), and found that 43.6% of students exhibited symptoms that met the criteria for orthorexia. The results of this study also indicate a statistically significant difference between men and women who exhibit symptoms of orthorexia, with the symptomology being more prevalent in men. Additionally, this study indicated that rates of orthorexia are higher for students who are younger than 21 years of age in comparison with their older counterparts. The findings also indicated a positive correlation between symptoms of orthorexia and body mass index (BMI). As both of these Turkish studies were conducted on an occupationally homogenous sample, it is difficult to apply the research to other populations.

The final Turkish study was conducted by Aksoydan and Camci (2009) and examined symptoms of orthorexia nervosa in a group of performance artists. Ninety-four subjects (55 female and 39 male), participated in this study: 46.8% were opera singers (M age = 38.8 years), 29.9% were ballet dancers (M age = 26.8 years), and 23.4% were symphony orchestra musicians (M age = 30.0 years). The findings in the study indicate that 54.6% of participants had orthorexic symptoms, and that the subgroup of participants with the highest rates of orthorexia (81.8%) were opera singers. Ballet dancers and symphony orchestra musicians had lower rates of orthorexia—32.1%, and 36.4% respectively. The authors suggest that orthorexic eating patterns may be prevalent in

individuals involved in the field of performance arts. The results of this study also indicate that orthorexia is more prevalent in males, with the difference in symptoms between males and females being statistically significant. Additionally, this study indicates that symptoms of orthorexia may increase with age, which is the opposite of what Donini's (2004) study found. Similar to Fidan's study, the results of this study showed that individuals with the most symptoms of orthorexia were overweight or obese. This finding may be attributed to the idea that once an individual becomes overweight or obese, they begin to pay more attention to the quality of food that they eat in addition to the calories they ingest. Additionally, the finding suggests that in contrast to Donini et al., Aksoydan and Camci found that higher levels of education were most likely to accompany symptoms of orthorexia—though this finding was not statistically significant. However, due to the limited sample in this study, it is again difficult to justify the findings. It is also unclear why a disproportionate number of studies conducted on the concept of orthorexia have been conducted in Turkey, though it may have to do with several recent studies finding that rates of obesity and diabetes have been increasing in Turkey over the past decade (Erem et. al., 2004; Yumuk, 2005)

An Austrian study examined the prevalence rates of symptoms of orthorexia in 238 female dietitians (*M* age = 36.2 years) and found that 12.8% of subjects met the cut-off for orthorexia (Kinzl et al., 2006). This study also indicated that 52.3% had no symptoms of orthorexia, and 34.9% showed “some symptoms” of orthorexia. Kinzl and colleagues proposed that orthorexia nervosa is more prevalent in individuals who work in dietary and nutritional fields. However, the study was conducted only with female participants and included no control group, so the results must be interpreted with

caution. Another study was conducted on students of nutritional sciences in Hamburg, Germany. In order to test a theory that nutrition students have more disordered eating patterns, which may motivate them to study nutrition, a cross-sectional comparison was conducted on nutrition students in their first year ($n = 123$) and nutrition students in later semesters ($n = 96$) with a control group from students in other programs ($n = 68$, $n = 46$). The findings illustrated lower orthorexic tendencies in more advanced nutrition students as well as no indication that students of nutrition have more disturbed eating patterns than other students (Korinth, et al., 2008). A major limitation of this study is that the sample comes only from German universities, so it is difficult to determine whether the results can be generalized to different populations in other countries or to those from differing cultures.

Another preliminary study sought to find a relationship between fitness and orthorexia nervosa in Sweden. Eriksson and colleagues (2008) collected data from 166 female and 85 male participants for a total of 251 individuals who engaged in some form of fitness activities (M male age = 28; M female age = 32), and found that 66% of the men and 54% of the women exercised at least 3-4 times per week. The results also indicated that in females, symptoms of orthorexia were higher only in those who exercised more frequently than other fitness center exercisers. Though this study is the only one that has been conducted on orthorexia and exercise habits, the findings do suggest that there may be a link between exercise level, lifestyle, and orthorexia.

Another study was conducted on athletes in Italy (Segura-Garcia, 2011) in order to examine the occurrence of orthorexia nervosa in athletes and to verify the relationship between orthorexia and eating disorders. Segura-Garcia and colleagues administered

measures of orthorexia, disordered eating, and body uneasiness to 517 athletes and 217 matched controls and found a significant positive correlation between the ORTO-15 and the EAT-26 in athletes. Additionally, among the athletes, predictors of orthorexia included previous dieting and features of obsessive-compulsive disorder such as rituals and compulsions. The findings suggested that athletes may be more susceptible to developing symptoms of orthorexia as well as other eating disorders. As the results of this study were primarily applicable only to the subset of the population that included athletes, it is difficult to generalize these findings to other populations. However, the findings suggest that further research on the concept of orthorexia among athletes should be done.

Finally, one study has been conducted in the United States as a dissertation. McInerney-Ernst (2011) conducted research on 163 students at the University of Missouri at Kansas City. Her data included self-reported responses to measures of demographic factors, lifestyle, anxiety, obsessive-compulsive disorder, eating disorders, and health concerns. McInerney-Ernst found that 82% of her sample met the criteria for orthorexia nervosa, based on Donini's (2004) cut-off of 40. The results of her study did not confirm the risk factors that have been identified by previous studies, such as gender (being male), lower education levels, higher socioeconomic status, or being married. However, her study did find that orthorexia nervosa shares many characteristics with established eating disorders, such as eating concern and worry about food that has been eaten. Despite these findings, when an analysis was conducted on the ORTO-15, McInerney-Ernst found a low Cronbach alpha coefficient of .14 which suggests that the measure has poor internal consistency. McInerney-Ernst also conducted a factor analysis

and found that two factors: “eating concern and worry” and “perceived benefits of healthy eating” were two components the ORTO-15 measures. Two items, addressing the taste of food being more important than the quality and believing that unhealthy food is also sold in stores, did not load sufficiently on either component. Coupled with the extremely high number of individuals in her sample that met the criteria for orthorexia nervosa, it can be deduced that the ORTO-15 measures is not valid for an American sample. Still, it is the only existing measure that does have psychometric data available. More research is necessary to determine if orthorexia is in fact a disorder in the United States, or if it relates to other constructs.

Eating Disorders and Orthorexia Nervosa

To date, the majority of studies conducted on orthorexia conflict regarding the conceptualization of the disorder. It is unclear from the literature if orthorexia is an eating disorder that deserves its own category separate from other eating disorders, if it is a variation on a currently recognized eating disorder, or if it is a disorder at all. Though no research specifically addresses this issue, a few studies indicated that orthorexia shares many characteristics with anorexia nervosa (Fidan, 2010; Mathieu, 2005). Characteristics shared include higher anxiety, a need to control external environmental factors, and a possible genetic predisposition for perfection. In contrast, when Bratman (2000) was initially conceptualizing orthorexia, he felt that it ought to be categorized as a unique eating disorder. However, he has also argued that there is an overlap between orthorexia and anorexia, and compared the chronic nature of both disorders.

One Brazilian study aimed to point out similarities and differences between the eating behaviors observed in those with orthorexia and in more recognized eating

disorders such as anorexia and bulimia nervosa. Martins and colleagues (2011) theorized that most individuals with any form of an eating disorder who subject themselves to rigid beliefs about food lose their “power of choice,” become chronically anxious, frustrated, and disappointed in themselves for being unable to comply with self-imposed standards meant to achieve an ideal diet. Additionally, Martins et al. stated that some ideological and behavioral characteristics distinguish individuals with orthorexia from individuals with other eating disorders. According to their research, individuals with anorexia and bulimia are motivated by weight loss, whereas individuals with orthorexia are motivated by goals of achieving a healthy diet. Also, Martins suggests that treatment resistance may be lower in individuals with orthorexia in relation to individuals with other eating disorders. Because eating disorders are classified as ego syntonic, individuals are less likely to understand that their behaviors are unhealthy and inappropriate and more likely to deny the disorder as well as its severity (Polivy & Herman, 2002). This statement coupled with Martins (2011) findings suggest that orthorexia nervosa should be treated as a separate construct than already-defined eating disorders. However, it could be argued that based on Bratman’s (2000) anecdotal evidence, individuals with orthorexia would also deny their symptoms as they see themselves as healthy and disciplined and cannot imagine any adverse consequences to their eating behaviors. Though these symptoms do suggest that there may be some overlap in characteristics of orthorexia and anorexia, according to *DSM-IV-TR* criteria, diagnosis of eating disorders must include other additional criteria such as low weight (in individuals with anorexia nervosa), compensatory behaviors (in some disorders), and amenorrhea (American Psychiatric Association, 2000). Perhaps taking this knowledge into consideration, one researcher has

suggested that it may be appropriate to consider the development of orthorexia symptoms as a risk factor for developing a future eating disorder (MacEvelly, 2001). Also considering Kinzl's (2006) study, in which findings indicated that the dieticians who met the criteria for orthorexia had experienced eating disorders in the past more frequently than their non-orthorexic colleagues it may be a possibility that individuals who are in recovery from an eating disorder may turn to orthorexic behaviors in an attempt to maintain certain behaviors.

Another study aimed to compile a list of "new" eating disorders that researchers have studied in an attempt to achieve DSM-5 recognition. Vandereycken (2011) selected terms such as Night Eating Syndrome, Muscle Dysmorphia, Emetophobia (fear of choking), and Orthorexia, for a field study in which he studied the proportion of attention the terms were getting from professionals versus popular media. Vandereycken organized an opinion poll among professionals in the field of eating disorders by presenting them a provisional set of diagnostic criteria of the disorders. A list of the characteristics of orthorexia has been compiled by Vandereycken (2011) based on the data compiled by Bratman (1997), Donini et al. (2005), and Mathieu (2005).

1. A strong preoccupation with "healthy eating" as manifested by the avoidance of all foods or ingredients considered by the subject to be "unhealthy" such as those containing preservatives or manmade food additives.
2. An unusual concern about one's own health.
3. Significant distress or impairment in social, occupational, or other important areas of functioning.
4. Due to selective eating, malnutrition and weight loss can ensue.

5. The symptoms are not due to another mental disorder (e.g., hypochondriasis or anorexia nervosa).

The format of this list was meant to be written in the style of the *DSM*, and was e-mailed to 472 Dutch speaking professionals for their opinion. The respondents were all actively involved in research, prevention, or treatment of eating disorders. The set of criteria for orthorexia was followed by a series of statements with which the respondent could agree, disagree, or remain neutral: 1) This disorder is totally unknown to me; 2) I have observed this disorder in my own practice; 3) This disorder is a creation of the popular media and the internet; 4) This disorder is just a variant of another disorder; and 5) This disorder deserves more attention from researchers and clinicians. Vandereycken found that orthorexia was the best known and Night Eating Syndrome the least known disorder. Also, orthorexia scored highest regarding professionals who have observed the disorder in their own practice. Out of all of the eating disorders polled, muscle dysmorphia was least represented on the internet followed by orthorexia and emetophobia. Both orthorexia and emetophobia also displayed a comparable lack of interest or representation in the professional literature (PubMed, PsychInfo, and Google Scholar). The number of publications in the world of professional literature did not correspond with the level of familiarity of the respondents in Vandereycken's study. It is evident that though orthorexia is a recognizable term, there is a clear lack of empirical research on the topic; there is much research that ought to be conducted.

Finally, considering all of the preliminary data that has been collected on the prevalence of orthorexia, it is evident that gender differences between orthorexia, anorexia nervosa, and bulimia nervosa exist. Research that has been conducted on gender

differences in orthorexia suggests that orthorexia may be more prevalent in men (Aksoydan & Camci, 2009; Donini et al., 2004; Fidan et al., 2010). However, both anorexia and bulimia are more prevalent in females (Fairburn, Cooper, Shafran, & Wilson, 2008). The only existing eating disorder that does have a higher ratio of males to females is binge-eating disorder (Barlow, 2008). Though this eating disorder is not classified in the *DSM-IV-TR*, it is included in the appendix as a diagnosis for further study. Because current conclusions related to whether or not orthorexia nervosa is a unique disorder or simply a form of another disorder are based on primarily anecdotal evidence, a need for more research comparing and contrasting orthorexia with eating disorders is necessary.

Anxiety and Orthorexia Nervosa

Also based on anecdotal evidence is the comparison of orthorexia nervosa to an anxiety disorder: obsessive-compulsive disorder (Bratman, 2000). Bratman describes in his book what he has observed to be an obsessive adherence to dietary requirements: weighing or measuring all consumed food, engaging in excessive planning of meals, dwelling on past and future meals, and experiencing compensatory guilt when straying or deviating from self-imposed guidelines. Mathieu (2005) has also considered the overlap between anxiety and perfectionism in individuals who have orthorexia, and believes that the obsessive component of the disorder is the emphasis on “pure” eating behaviors.

Donini and colleagues (2005) also considered the obsessive-compulsive nature of orthorexia, and based some of their findings on scale 7 of the MMPI test, which measures worry, anxiety, tension, doubts, obsessiveness. The researchers found individuals who had orthorexia also presented with obsessive traits, but explained that further

investigation is necessary and new questions intended to evaluate obsessive-compulsive behavior should be added to the ORTO-15. Additionally, Donini and colleagues' 2004 study examined the emotivity of subjects regarding the impulse to eat. They found that orthorexic subjects more frequently showed strong or uncontrollable urges to eat, together with a feeling of guilt, excitement, or of happiness. Only the relationship between the urge to eat and feelings of guilt was statistically significant.

As with the comparison between orthorexia and other eating disorders, the evidence related to orthorexia and anxiety disorders is largely anecdotal and conducted on participants from other cultures. It is also necessary to consider specific criteria of obsessive-compulsive disorder in the *DSM-IV-TR* to compare it to symptoms and behaviors that individuals with orthorexia nervosa exhibit. Based on comparisons between both anorexia nervosa and obsessive-compulsive disorder to orthorexia nervosa, data on the relationship between anorexia and OCD should be considered. Theil and colleagues (1995) found a significantly significant relationship between disordered eating and obsessive compulsive disorder in their study of ninety-three women with anorexia nervosa or bulimia nervosa. Using a structured diagnostic interview and the Yale-Brown Obsessive-Compulsive Scale they found that over one-third of participants met clinical cut-offs for obsessive-compulsive disorder. Another study conducted by Halmi and Sunday (2003) studied a sample of 324 women with anorexia nervosa—restricting type, and bingeing and purging type. Using the Yale-Brown Obsessive-Compulsive Scale and a valid semi-structured interview, researchers found that lifetime obsessions and compulsions were present in 68% of the restricting-type anorexia group and in 79.1% of the binge/purge anorexia group. Because of comparisons between orthorexia nervosa and

anorexia nervosa (Bratman, 1997, Fidan, 2010, & Mathieu, 2005), it is important to include an obsessive-compulsive disorder measure in any study on orthorexia nervosa.

Quality of Life and Orthorexia Nervosa

Though there is no empirical evidence that orthorexia nervosa causes significant clinical distress or impairment, Bratman's anecdotal evidence led him to believe that there are both physical and psychological effects on individuals with orthorexia that affect their quality of life. Bratman and Knight (2000) believe that orthorexia appears to manifest as a combination of mental attitudes and behaviors that affect individuals physically, psychologically, and socially.

Physically, Bratman purports that the consequences of orthorexia can include nutritional and mineral deficiencies. This phenomenon occurs as a result of individuals omitting specific food items and even entire food groups from their diets. However, the concept of "healthy" is extremely subjective and may change depending on a person's mood, or as a person learns more about diet and nutrition. Even while individuals with orthorexia focus on the quality of the food they ingest, it is difficult to measure each individual's perception of what "healthy" food is. None of the current studies on orthorexia identify a clear system for measuring healthy eating. Additionally, there are no long-term studies on orthorexia, which make Bratman's anecdotal evidence of individuals with severe nutritional deficiencies the only current data on negative medical outcomes (Bratman, 2000).

Bratman also proposes many psychological consequences that can manifest in individuals with orthorexia. An individual with orthorexia can turn food into a religion, invoke a sense of spirituality in the act of choosing and eating food, and can experience a

“fall from grace” when deviating from an ideal diet or pattern of eating (Bratman & Knight, 2000, pg. 10). Bratman believes that individuals with orthorexia nervosa have a higher sense of self-esteem than a non-orthorexic individual, and will therefore experience a drop in self-esteem when eating an unhealthy food. Additionally, individuals with orthorexia may devote the majority of their time to meal-planning as well as purchasing, organizing, and preparing foods that are considered to be pure and nutritionally sound. This so-called “worship” of food causes individuals to dedicate their whole existence to thoughts and behaviors related to food for consumption (Donini, et al., 2004). Some individuals take this behavior even further and punish themselves when they have violated their personal food rules. They may even believe that by adhering to a rigid diet, they are becoming more pure or coming closer to perfection. The overwhelming and obsessive desire to feel pure and natural begins to override other pleasurable aspects of life in individuals with orthorexia (Mathieu, 2005). There is empirical research on the relationship between eating disorders and perfectionism so the relationship between orthorexia and perfectionism should also be investigated (Hewitt, Ediger & Flett, 1995).

Finally, consequences related to social isolation and the general well-being of an individual with orthorexia may occur. Social isolation occurs as a result of the lifestyle the individual with orthorexia follows. These individuals may begin to bring their own food to social gatherings or decide not to dine with others as a result of a strict dietary regimen or a fear of eating an unacceptable food item. Some individuals may begin to feel morally superior to others who do not follow such strict dietary guidelines and this

may decrease their contact with those they feel do not understand their eating choices (Bratman, 2000).

All of these factors are cited by Bratman as reasons for labeling orthorexia nervosa as a distinct disorder that is separate from other eating disorders. Though there are several new studies that suggest a correlation between orthorexia and patterns of disordered eating, anxiety, and OCD, no scholarly articles, with the exception of a single dissertation, are found examining the incidence of orthorexia in the United States. This lack of empirical data combined with the unique social atmosphere related to diet, weight management, and body image in America raises the important question of whether orthorexia in America is simply a new trend or whether it is a distinct psychological disorder.

Investigative Hypotheses

This study intends to fill a major gap in investigating the relationship between orthorexia nervosa and symptoms of anxiety, obsessive-compulsive behavior, and disordered eating behaviors, as well as examine the relationship between orthorexia and general well-being in an American college sample. A nonclinical Eastern Illinois University college sample will be recruited in order to examine the relationships between a range of measures. The central hypotheses for the study follow:

(1) Symptoms of orthorexia nervosa will be positively associated with measures of anxiety and obsessive-compulsive disorder. Both Donini and colleagues (2005) and Bratman (2000) drew comparisons between symptoms of orthorexia and obsessive-compulsive disorder, citing excessive planning of meals and obsessively adhering to specific dietary requirements as signals that the two disorders may be related. Mathieu

(2005) also stated that there may be an overlap between anxiety and perfectionism in individuals who have orthorexia. Additionally, some questions on the ORTO-15 are reminiscent of questions that may be asked when screening for an anxiety disorder. For example: Does the thought of food worry you for more than three hours a day? This question measures some level of rumination as well as severity of a symptom, both of which are often key aspects in measures designed to evaluate the symptoms of anxiety or obsessive-compulsive disorder.

2) Higher symptomology on the ORTO-15 will not be positively associated with higher scores on the EAT-26. Though previous research has not specifically addressed the issue of whether orthorexia is a variation of an eating disorder or is a disorder on its own, the comparisons that have been made between orthorexia nervosa and anorexia nervosa are weak. Fidan (2010) and Mathieu (2005) both suggest that characteristics present in both anorexia and orthorexia are a need to control external environmental factors, and a possible genetic predisposition for perfection. However, none of the studies that have been conducted on orthorexia address either of those issues. Additionally, when considering DSM-IV criteria for anorexia such as low weight and amenorrhea, neither criterion has been discovered in samples that were symptomatic of orthorexia. Amenorrhea has never been included in any study design, and both Fidan (2010) and Aksoydan and Camci (2009) found that individuals with the most symptoms of orthorexia were overweight or obese. Finally, it can be argued that current established eating disorders primarily concern the quantity of food ingested (Crisp, 2006), rather than focusing on the quality of food ingested, which is one of the primary features of orthorexia (Bratman, 2000; Donini et. al., 2004).

3) Lower body-mass index will be positively associated with a higher quality of life. Though there are no current studies on the relationship between body-mass index and life satisfaction in a non-clinical sample, some research has been conducted on health-related quality of life and BMI. Kruger and colleagues (2007) found that in a sample of 9,173 participants over the age of 18 in the United States health-related quality of life was inversely related to BMI. Obese adults were more likely to report poor quality of life in domains of physical and mental health than were overweight or normal weight adults. Dixon (2002) also found that psychological status as well as quality of life increased after significant weight loss.

4) More males will endorse symptoms of orthorexia nervosa than females. Several studies found the incidence of orthorexia nervosa to be higher in male participants (Aksoydan and Camci, 2009; Donini, 2004; Fidan 2009). These findings may also be interpreted as another argument against considering orthorexia nervosa a form of a currently established eating disorder, as gender differences among individuals with eating disorders exist. Lifetime prevalence estimates of DSM-IV anorexia nervosa, bulimia nervosa, and binge eating disorder are .9%, 1.5%, and 3.5% among women, and .3% .5%, and 2.0% among men (American Psychological Association, 2000).

Method

Participants and Procedure

172 Eastern Illinois University undergraduates participated in this study in order to fulfill their class research requirement in Spring of 2012. The majority of the participant pool was female ($n = 101$) and the mean age for both males and females was 19.83 ($SD = 2.73$, range 18- 39 years). Sixty-nine percent identified their ethnicity as

Caucasian, 23.84% were African-American, 4.65% were Hispanic, 1.62% were Asian, and 2.32% identified as Other or as Multi-Ethnic. Participants took part in this study to receive class credit and signed informed consent forms prior to taking the paper-pencil questionnaires in a lecture hall. To control for any possible order effects, the order of the questionnaires was varied randomly in each packet—however the ORTO-15 was placed first in each packet. Both the consent form and the demographic questionnaire are located in Appendix C.

Measures

Demographic Questionnaire

Participants filled out a demographic questionnaire which includes queries about age, sex, year in school, major and minor, ethnicity, height, weight, alcohol use, tobacco use, and other drug use. Body-mass Index was calculated for participants based upon their height and weight using the National Institute of Health's BMI calculator which uses the formula: $BMI = \text{weight (pounds)} * 703 / \text{height squared (inches}^2\text{)}$ (National Institute of Health, 2008).

Test for the Diagnosis of Orthorexia Nervosa (ORTO-15; Donini et al., 2005).

The ORTO-15 is a self-report measure of symptoms of orthorexia nervosa that consists of 15 items. The items are rated on a 4-point Likert scale and items that are scored with a "1" indicate a higher severity of symptoms and items that are scored with a "4" indicate less symptomatic behaviors. The cutoff for the measure is 40, with scores below the cutoff indicating that an individual has orthorexia nervosa. In Donini's (2005) validation study, he found that the area under the ROC curve, which represents the overall accuracy of the ORTO-15 as a test for the diagnosis of orthorexia nervosa was found to be 0.696

(95% CI: 0.585 – 0.807). Despite limited information about the validity of this measure, several researchers have used the measure in their own studies (Aksoydan & Camci, 2009; Bosi et. al, 2007; Fidan, 2010). McNerney-Ernst (2011) also used the measure, despite her findings that the test demonstrated poor internal reliability. The ORTO-15 was used in this study with permission from the author.

Eating Attitudes Test (EAT-26; Garner et al., 1982).

The EAT-26 is an instrument used to screen individuals who have indicated some form of disordered eating behavior. The instrument is not intended to diagnose—rather, it serves as a way to determine whether additional testing is required to make a diagnosis of an eating disorder. There are three subscales in the EAT-26: Dieting, Bulimia and Food Preoccupation, and Oral Control. Participants answer questions based on a six-point Likert scale in which Always = 3, Usually = 2, Often = 1, Sometimes = 0, Rarely = 0, and Never = 0. Only one question is scored in the reverse manner. The points are totaled to calculate the score, and a total score of more than 20 is the typical cut-off for which significant symptomology of disordered eating is present (Garner, Olmsted, Bohr, and Garfinkel, 1982). The EAT-26 is one of the most widely used standardized measures of symptoms of disordered eating. The original validation study of the EAT-26 showed that the three subscales were interrelated and the result of the study was that the measure is a reliable, valid, and economical instrument to be used as an objective measure of the symptoms of anorexia nervosa and bulimia nervosa (Garner, et al., 1982). This measure is available to the public.

The State-Trait Anxiety Inventory --Form Y (STAI; Spielberg, 1983).

The STAI is made up of two separate 20-item self-report inventories for measuring state and trait anxiety. The items for the state scale require participants to rate the intensity of their feelings in the particular moment on a 4-point scale: 1) not at all, 2) somewhat so, 3) moderately so, 4) very much so. The trait scale follows the same rating system and asks participants to rate how they have felt over the past 3 months. Studies conducted on the psychometric properties of Form & have suggested that the items provide clear distinctions between state and trait anxiety (Spielberger, 1983). Additionally, internal consistency is higher than .90 for each of the two scales on the basis of the standardization subsamples of college students, high-school students, and working adults. Both the state and trait scales are positively correlated with the Anxiety Sensitivity Index (Petersen & Reiss, 1987). Each scale is scored separately and the scores can range between 20 and 80 with a higher score indicating greater anxiety. This scale was used with written permission from the author, and an arrangement to share the results of this study.

The Florida Obsessive-Compulsive Inventory (FOCI; Storch, et al., 2007).

The FOCI is a self-report questionnaire that evaluates the severity of symptoms associated with obsessive-compulsive disorder. The measure consists of 20 dichotomous yes/no questions which serve as a symptom checklist followed by 5 questions on a 5-point Likert scale which serve to gauge severity. Storch et al (2007) found that in a non-clinical sample of 253 college students, the symptom checklist and severity scale both demonstrated good internal consistency (.83). The concurrent and divergent validity of the FOCI was also supported through correlations with the Beck Depression Inventory II

and the State-Trait Anxiety and Depression inventories. The scale also highly correlates with another validated Obsessive-Compulsive scale, the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman et al., 1989). The FOCI is intended to be a time-effective way to gauge the severity of symptoms of obsessive-compulsive disorder before continuing with further evaluation. This scale was used with written permission from the author.

The Satisfaction with Life Scale (SWLS; Diener, et al., 1985).

The SWLS was developed to assess for satisfaction life as a whole. It is a self-report measure consisting of 5 statements, all of which focus on global life satisfaction. The scale does not tap into related constructs such as positive affect or loneliness, but has been shown to have favorable psychometric properties including high internal consistency and moderate temporal reliability. Deiner (1985) reported a coefficient alpha of .87 for the scale and a two-month test-retest stability coefficient of .82. When taking the test, the participant should agree or disagree with each of the five statements on the test on a 7-point scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Slightly Disagree, 4 = Neither Agree or Disagree, 5 = Slightly Agree, 6 = Agree, and 7 = Strongly Agree. The scores are added for a total measure of life satisfaction. The higher the score, the higher the level of satisfaction an individual reports. This measure is available for public use.

Results

A total of 172 participants were included in the final data analysis. Two participants were excluded for being under the age of 18. There were no missing cases of data because the researcher looked over each survey packet as it was turned in and advised participants to return to a particular question if the answer was missing.

Participants self-reported demographic data are reported in Table 1. The sample consisted primarily of female undergraduate students ($n = 101$) between the ages of 18 and 39 years ($M = 19.83$, $SD = 2.73$). The majority of participants were Caucasian ($n = 119$) and were freshman students ($n = 96$). Male students had an average body-mass index of 24.9 ($SD = 4.02$), which is at the highest end of “normal status” (CDC, 2011). Female students had an average body-mass index of 25.08 ($SD = 6.53$), which is at low end of “overweight status” (CDC, 2011). In the entire sample, 12% of men were overweight (but not obese) with an average BMI of 26.63 ($SD = 1.39$) and 10% of women were overweight (but not obese) with an average BMI of 27.34 ($SD = 1.32$). Four percent of men were obese with an average BMI of 34.36 ($SD = 3.27$) and 10% of women were obese with an average BMI of 37.82 ($SD = 5.15$). The interpretation of BMI for adults is located in Appendix D. The majority of participants reported that they did not smoke cigarettes, and 79% of students reported drinking alcohol, with an average of 4.08 ($SD = 3.84$) drinks on a typical day that they do drink. Finally, very few participants ($n = 36$, 21%) reported engaging in other drug use, with 33 of those participants engaging in marijuana use.

Table 1

Demographic Characteristics of Study Participants (Self-Reported) (n = 172)

Variable	<i>n</i>	%
Age (Mean, SD)	(19.83)	(2.73)
Gender		
Male	71	41.28
Female	101	59.72
Year in School		

ORTHOREXIA NERVOSA

Orthorexia Nervosa 32

Freshman	96	55.81
Sophomore	41	23.84
Junior	18	10.47
Senior	15	8.72
Graduate Student	2	1.16
Ethnicity		
Caucasian	119	69.19
African-American	41	23.84
Hispanic	8	4.65
Asian/Pacific Islander	2	1.62
Other/Mixed Race	2	1.62
Weight in pounds (Mean, SD)		
Male	(178.00)	(32.35)
Female	(147.92)	(40.00)
Height in inches (Mean, SD)		
Male	(70.83)	(2.96)
Female	(64.50)	(2.69)
BMI (Mean, SD)		
Male	(24.90)	(4.02)
Female	(25.08)	(6.53)
Alcohol Use		
Yes	136	79.07
# of drinks per typical drinking day (Mean, SD)	(4.08)	(3.84)

Tobacco Use		
Yes	29	16.86
# of cigarettes per day (Mean, SD)	(6.69)	(6.73)
Other Drug Use		
Yes	36	20.93

In addition to conducting descriptive statistics for demographic data, means and standard deviations were derived for each of the measures used in this study. These results are listed in Table 2. One-hundred and nineteen students met the criteria for orthorexia nervosa, scoring below the cut-off of 40 ($M = 37.52$, $SD = 3.57$). Participant scores ranged from 23 to 45 on this measure. Participants reported very minimal disordered eating patterns ($M = 8.24$, $SD = 7.73$), with the cut-off for the EAT-26 being 20. Next, participants endorsed similar levels of state anxiety ($M = 37.43$, $SD = 10.54$) and trait anxiety ($M = 40.18$, $SD = 10.10$) which were well below the cut-off of 80 for State-Trait Anxiety Inventory. Minimal symptoms and severity of obsessive-compulsive disorder were also reported on the Florida Obsessive-Compulsive Inventory symptom checklist ($M = 4.47$, $SD = 3.90$) and severity scale ($M = 2.84$, $SD = 3.64$). In order to achieve a clinically significant score on the FOCI, participants would have had to score above an 8 on the severity scale. Finally, most participants reported average to high levels of life-satisfaction ($M = 24.82$, $SD = 6.02$). Scores of 20-24 indicate an average score, and scores of 25-29 indicate a high score of life satisfaction. Scores of above 29 indicate a very high score, and scores of 15-19 indicate slightly below average life satisfaction. Scores below 15 indicate extreme life dissatisfaction.

Table 2
Means and Standard Deviations for Self-Reported Measures (n = 172)

Variable	Mean	SD	Range (min-max)	Cutoff
ORTO-15	37.52	3.57	23-45	<40
EAT-26	8.24	7.73	0-48	>20
STAI (state)	37.43	10.54	20-65	
STAI (trait)	40.18	10.10	20-64	
FOCI symptom checklist	4.47	3.90	0-19	
FOCI severity scale	2.84	3.64	0-15	>8
SWLS	24.82	6.02	6-35	

Based on the cut-off of 40 for the ORTO-15, the majority of participants (69%) met the criteria for having orthorexia nervosa. Because this number is so high, and includes so many of the original participants, the cut-off was amended to 35, which Donini (2005) had suggested as an alternate cut-off. Using a cut-off of 35, 21% of the participants met the criteria for orthorexia. One of the primary reasons for conducting this study was to fill a major gap in identifying the characteristics of individuals who are purported to have orthorexia nervosa. Thus, descriptive statistics were also performed solely on the portion of the study's sample in which individuals met the criteria of having orthorexia nervosa ($n = 36$) based on the cut-off of 35. The findings of these computations are listed in Table 3. The subset of the sample who met the criterion for orthorexia consisted primarily of females ($n = 23$). The average age of this subset is 19.58 years ($SD = 1.27$). The majority of participants were also Caucasian ($n = 22$) and freshmen ($n = 20$). None of the Asian/Pacific Islanders or graduate students from the overall sample met the criteria for orthorexia. The average body-mass index of male

students with symptoms of orthorexia nervosa was within the normal weight range for adults ($M = 24.19$, $SD = 2.53$). The average body-mass index of female students with symptoms of orthorexia nervosa was also within the normal weight range for adults ($M = 23.70$, $SD = 4.55$). Of the individuals in the sample who met the criteria for orthorexia, 11% of men were overweight (but not obese) with an average BMI of 26.90 ($SD = 1.94$) and 19% of women were overweight (but not obese) with an average BMI of 27.26 ($SD = 1.28$). None of the men in this group were obese and one woman was obese with an average BMI of 38.30. Most participants in this group (81%) also reported drinking alcohol, and reported drinking an average of 3.22 drinks ($SD = 3.56$) on a typical day that they drink alcohol. About 17% of the participants reported smoking cigarettes and smoked an average of 1.50 cigarettes ($SD = 4.80$) per day and 22% of the participants also reported engaging in other drug use.

Table 3
Demographic Characteristics of Individuals with Orthorexia (Self-Reported) (n = 36)

Variable	n	%
Age (Mean, SD)	(19.58)	(1.27)
Gender		
Male	13	36.11
Female	23	63.89
Year in School		
Freshman	20	55.56
Sophomore	10	27.78
Junior	4	11.11
Senior	2	5.56
Graduate Student	0	0.00

Ethnicity

Caucasian	28	77.78
African-American	5	13.89
Hispanic	2	5.56
Asian/Pacific Islander	0	0.00
Other/Mixed Race	1	2.78

Weight in pounds (Mean, SD)

Male	(171.69)	(17.45)
Female	(138.33)	(26.28)

Height in inches (Mean, SD)

Male	(70.54)	(1.61)
Female	(64.07)	(3.09)

BMI (Mean, SD)

Male	(24.19)	(2.53)
Female	(23.70)	(4.55)

Alcohol Use

Yes	29	80.56
# of drinks per typical drinking day (Mean, SD)	(3.22)	(3.56)

Tobacco Use

Yes	6	16.67
# of cigarettes per day (Mean, SD)	(1.50)	(4.80)

Other Drug Use

Yes	8	22.22
-----	---	-------

Analysis of Hypotheses

A correlation matrix was produced to state the results of Pearson product-moment correlations that analyzed the relationships between body-mass index, symptoms of orthorexia, symptoms of disordered eating, symptoms and severity of obsessive-compulsive disorder, state and trait anxiety, and satisfaction with life. This information is presented in Table 4.

Based on the findings from previous research, hypothesis one proposed that symptoms of orthorexia would be positively associated with measures of anxiety and obsessive-compulsive disorder. However, symptoms of state anxiety were only positively correlated with symptoms of disordered eating ($r = .17, p < .05$), symptoms of obsessive-compulsive disorder ($r = .37, p < .01$), severity of obsessive-compulsive disorder ($r = .48, p < .01$), and trait anxiety ($r = .77, p < .01$). These results suggest that increases of symptoms of state-anxiety are associated with endorsing symptoms and severity of obsessive-compulsive disorder as well as trait anxiety. Symptoms of state anxiety were also negatively correlated with satisfaction with life ($r = -.47, p < .01$), which suggests that the greater number of state anxiety symptoms endorsed, the lower the quality of life the individual experiences. Trait anxiety was only positively associated with symptoms of disordered eating ($r = .24, p < .01$), symptoms of obsessive-compulsive disorder ($r = .45, p < .01$), severity of obsessive-compulsive disorder ($r = .44, p < .01$), and state anxiety. Neither symptoms of anxiety nor obsessive-compulsive disorder were significantly associated with symptoms of orthorexia nervosa.

Hypothesis two suggested that higher symptomology of orthorexia nervosa would not be associated with symptoms of disordered eating. In fact, there was a negative

correlation between disordered eating behaviors and orthorexia nervosa ($r = -.33, p < .01$) which suggests that endorsing a higher number of orthorexia nervosa symptoms is significantly related to more symptoms of disordered eating. Next, hypothesis three proposed that lower body-mass index would be positively associated with higher life satisfaction. Indeed, there was a negative correlation between body-mass index and satisfaction with life ($r = -.27, p < .01$). This finding supports the hypothesis that participants with a lower body-mass index will also experience more life satisfaction.

Table 4
Correlations between measures (n = 172)

Measure	1	2	3	4	5	6	7	8
1. BMI	--	.12	.01	-.05	-.10	-.01	.07	-.27**
2. ORTO-15		--	-.33**	-.01	-.04	-.04	-.02	-.03
3. EAT-26			--	.29**	.39**	.17*	.24**	-.12
4. FOCI symptoms				--	.64**	.37**	.45**	-.25**
5. FOCI severity					--	.48**	.44**	-.16*
6. STAI state						--	.77**	-.47**
7. STAI trait							--	-.55**
8. SWLS								--

* $p < .05$

** $p < .01$

Finally, hypothesis four proposed that more men than women would endorse symptoms of orthorexia nervosa. A t-test for independent means was conducted on sex. At an alpha level of .01, male participants did not endorse significantly higher symptoms of orthorexia nervosa ($M = 32.23, SD = 0.47$) than females ($M = 32.39, SD = 0.58$), $t(170) = 0.31, p = 0.415$ (one-tailed). Ultimately, there was almost no difference in the number of orthorexia nervosa symptoms that men and women endorsed.

Discussion

One of the primary purposes of conducting this study was to fill a major gap in the literature on orthorexia that pertains to demographic characteristics of individuals with orthorexia, prevalence rates, and other characteristics of orthorexia nervosa. The current study sample that met the criteria for orthorexia was predominantly female and Caucasian. About 70% of the entire sample met the criteria for orthorexia using the original cutoff of 40, which is higher than in previous studies (Aksoydan & Camci, 2009; Bosi et al, 2007; Donini, 2004; Kinzl et al, 2006) with the exception of the American dissertation (McInerney-Ernst, 2011). Using the amended cutoff of 35, 21% of the participants met the criteria for orthorexia. Although two Turkish studies (Aksoydan & Camci, 2009; Fidan, 2009) found that the subset of the population that met the criteria for orthorexia were overweight or obese, the findings of the current study found that the average body-mass index of the sample that met the criteria for orthorexia was within a normal weight range. This finding may be attributed to the recent increasing number of individuals in Turkey who are overweight or obese, as discussed previously (Erem et. al., 2004; Yumuk, 2005), as opposed to the state of American obesity, which has been established for some time.

When the original cutoff of 40 was used for this study, a majority of the participants met the criteria for orthorexia. This finding is not congruent with any other previous studies, except for McInerney-Ernst's (2011) dissertation—which is the only other study conducted in the United States. McInerney-Ernst also found through additional analysis of the ORTO-15 that the test has poor internal reliability. As Bratman (2000) stated, orthorexia nervosa is a psychological disorder that causes distress or impairment

in three realms: mental, physical, and social. However, psychological disorders in general are not typical or the norm; when the majority of participants meets the criteria for a purported disorder, the validity, reliability, and general psychometric properties of that measure must be more closely examined. Additionally, when the majority of individuals meet the criteria for any behavior, it may be necessary to assume that the behavior is normal.

Examining the prevalence rates for eating disorders is necessary, as orthorexia nervosa has been unofficially referred to as a type of eating disorder in several studies. The reported lifetime prevalence of anorexia nervosa among women has ranged from 0.9% to 2.2% in women and 0.2%-0.3% in men (Keski et al, 2008). The estimates for individuals with bulimia nervosa are slightly higher, which 1.5%-2% of women and 0.5% in men meeting the criteria for the disorder (Hudson et al, 2007). These prevalence rates are significantly lower than the previously measured rates for orthorexia nervosa, as well as the finding in the current study in which 21% of individuals met the criteria for orthorexia nervosa with the lower cutoff. Another disorder that has been compared to orthorexia is obsessive-compulsive disorder, which has an estimated lifetime prevalence rate of 2% - 3% and occurs equally in males and females (DSM-IV TR, 2000). Again, this number is significantly lower than the results of the current study have indicated for orthorexia—21% of the sample met the criteria for orthorexia. Thus, the findings of this study do not support previous findings regarding the prevalence of eating or anxiety disorders.

The first research question postulated that symptoms of orthorexia nervosa would be positively associated with symptoms of anxiety and obsessive-compulsive disorder.

This hypothesis was posited as a result of Donini's (2004) study in which altered MMPI scores for scale 7 (obsessive-compulsive traits) were analyzed. Additionally, the nature of some of the questions in the ORTO-15 measure time spent worrying, or feeling guilty, such as: In the last 3 months did the thought of food worry you? However, there was no association found between the orthorexia nervosa measure and measures of anxiety or obsessive-compulsive disorder.

In fact, the only significant association that occurred between the ORTO-15 and another measure was with the EAT-26. The results of the study indicate that symptoms of orthorexia nervosa are positively associated with symptoms of disordered eating—individuals that have self-reported symptoms of orthorexia are more likely to self-report engaging in disordered eating behaviors. McInerey-Ernst (2011) found the same correlation in her dissertation, but interpreted it to mean that individuals who self-reported symptoms of orthorexia were less likely to report engaging in disordered eating patterns. Because the ORTO-15 is scored in such a way that a higher score indicates less severity of symptoms, there may have been some confusion interpreting a negative correlation. Since the introduction of orthorexia nervosa to the scientific community, debate regarding whether orthorexia nervosa is an eating disorder has occurred. The majority of previous studies conflict regarding the conceptualization of the disorder, with some researchers stating that it is a separate construct (Bratman, 2000; MacEvelly 2001), and some drawing parallels between orthorexia and anorexia nervosa (Fidan, 2010; Martins et al, 2011; Mathieu, 2005). Those that compared orthorexia to already established forms of eating disorders cited a higher level of anxiety and a possible genetic predisposition to the disorder. However, the current study did not find a positive

association between anxiety and symptoms of orthorexia as measured by the ORTO-15.

There are also no studies that have investigated the genetic predispositions that individuals may have towards orthorexia, nor are there any that hypothesize what those predispositions may entail.

The third study hypothesis proposed that individuals with a lower body-mass index would report higher levels of life satisfaction. Indeed, the results of the current study confirmed this theory and a higher body-mass index was significantly associated negatively with satisfaction with life. However, this result may not transcend cultural boundaries. Swami et al (2010) found that in a study of participants in 26 countries, higher BMI and Western media exposure predicted body dissatisfaction among women, which is a variable that likely plays into life satisfaction. Additionally, the study found that the desire for thinness is more commonplace in higher-SES populations. One study (Canpolat, 2008) found that among Turkish adolescents, a thinner body ideal had more of a significant negative effect on life and body satisfaction than being overweight did. These findings all suggest that when considering the concept of orthorexia, using BMI as a variable may yield results that cannot be interpreted the same way within different cultures.

The fourth hypothesis in the current study aimed to investigate gender differences in reporting symptoms of orthorexia. It was hypothesized that more men would report symptoms of orthorexia nervosa than women. However, results of the present study found that endorsed symptoms of orthorexia were almost equal for males and females. Most prior studies found that a significantly larger number of men met the criterion for orthorexia nervosa, so this finding was surprising. However, the one study conducted in

the United States found that significantly more women than men met the criteria for orthorexia. It is important to consider possible cultural differences in health related behaviors and perception between genders in countries other than the United States. Additionally, the fact that the sample is composed of American college students may have contributed to the findings in the current study. The college experience is often different in European countries, with most students living at home rather than on campus or in their own apartments. Thus, many European college students may still be eating meals at home or have less food autonomy than would students who live away from home.

A few other findings that went beyond the scope of the hypotheses are also worthy of discussion. A significant positive correlation was found between self-reported disordered eating patterns, state and trait anxiety, and symptoms of obsessive-compulsive disorder. These findings confirm the results from many previous studies regarding the relationship between eating disorders, anxiety, and obsessive-compulsive disorder (Godart, 2002; Kay, 2004). Though the orthorexia scale may not be valid (or considering that orthorexia may not be a disorder), it is evident that the results of the study relating to the other self-reported measures can be corroborated with previous scientific literature.

Another interesting finding relates to the alcohol, tobacco, and other drug use that was reported by the study participants. Numbers of students who reported drinking, smoking, or using other drugs stayed the same for the overall sample and the subset of the sample that met the criteria for orthorexia. In fact, the number of students engaging in other drug use increased in the sample of students who met the criteria for orthorexia. This finding could be the result of the environment of an American college, and the fact

that many college students engage in more drug and alcohol use than the general population (O'Malley, 2002). Still, it is interesting to note that individuals who reported being concerned with their overall health as well as concern over eating still engaged in drinking, smoking, or other drug use.

Limitations and Further Recommendations

Though the present study was among the first to investigate symptoms of orthorexia nervosa in an American college sample, there were several limitations within the study. Foremost, the participants in the current study were quite homogenous and consisted of primarily female, Caucasian freshman students. The sample was not varied, and this was a result of studying individuals who came from a select pool of students who needed to gain credit for a psychology course by participating in a study. This limitation restricts the generalizability of the study findings to other populations. Additionally, all of the data was gathered via self-report, and this is a limiting factor. Because of the nature of the questions, students may have under-reported severe symptoms. A social desirability bias may have occurred, with participants being unwilling to report accurately in order to be seen in a more favorable light by the researcher—even though the anonymity of participant's answers was stressed. Or, participants may have been self-deluding in their answers. Many previous studies have indicated that in research studies, health behaviors tend to be over-reported while weight and engaging in risky behaviors such as drug use are subject to under-reporting (Adams et al., 2005; Craig & Adams, 2009; Fendrich, Mackesy-Amity, Johnson, Hubbell, & Wislar, 2005).

Next, it has become evident that the ORTO-15 generally lacks good psychometric properties. The only validation study that exists for the orthorexia nervosa measure is

Donini's (2005) study. McInerney-Ernst (2011) found in her research that the scale demonstrated low internal reliability and that two of the questions did not load on the two components that the scale measures: eating concern and worry, and the perceived benefits of healthy eating. The high number of students in the present study who met the criteria for orthorexia using Donini's (2004) cut-off of 40 is also an indicator that the measure is flawed. Even using Donini's (2005) alternative cut-off of 35, 21% of the sample met the criteria for orthorexia, which is still high compared to other non-American study findings. Furthermore, the questions posed in Donini's (2004) measure may be interpreted differently by individuals who have different conceptualizations of their own personal health. For example, an individual who has recently been diagnosed with diabetes or has had a recent health scare may be more inclined to worry about health more than someone who has good general health. These circumstances could change an individual's answers on various measures related to anxiety and eating behaviors. Thus, administering the ORTO-15 just once may also be a study limitation. Generalizing the results of the study to other populations based on one administration of the ORTO-15 may result in applying circumstantial findings to other individuals. It will be important for future research to evaluate for changes in behaviors and symptoms of orthorexia over time.

Finally, recent research has found limitations to using body-mass index as an indicator of health. Rothman (2008) reviewed many studies on BMI and found because the measure is based on self-reported height and weight, but is used an indirect measure of body-fat, there are various deficiencies related to the measure. First, he found that BMI does not necessarily reflect changes that occur with age—muscle mass decreases with age while the percentage of body fat increases. Though the current study's sample

included young adults, BMI would not discriminate between muscle mass or body fat. Student athletes, for example, would have lower body fat percentages and higher muscle mass. As muscle weighs more than fat (Huddy, 1993), a body-mass index measurement would not account for the difference as it only takes into account overall weight and height. Rothman (2008) also found that that BMI and percentage of body fat is not linear, and differs for men and women. Because the current study included both sexes, body-mass index reports may take on different meanings for men or women.

Despite limitations to the current study as well as previous literature, the topic of orthorexia nervosa ought to be investigated further in order to determine whether it can be considered as a disorder. Future studies should include a more varied sample that includes individuals from different age groups, different levels of SES, different ethnicities, and different geographic locations. Additionally, when administering the ORTO-15 with other measures, more than just one anxiety measure and one life-satisfaction scale should be given to the participants. Measures of body dissatisfaction, and a scale to measure concern with health status should also be administered.

In addition to varying the sample and increasing the number of measures used, the development of a valid orthorexia measure is necessary. Presently, very little progress has been made to establish the psychometric properties of the ORTO-15. Previous studies show deficits in the investigation of the validity of the ORTO-15—they have simply used the measure without questioning the psychometric properties, and have accepted the results. McNerey-Ernst's (2011) two-factor solution indicates that the ORTO-15 measures two distinctly different constructs: eating concern and worry, and perceived benefits of healthy eating. The ORTO-15 may need to include subscales or focus on one

major component. In addition to the lack of psychometric data available, there is no current formal operational definition of orthorexia nervosa, nor are there specific diagnostic criteria. The cut-off score for orthorexia must also be reevaluated. The number of individuals who meet the criteria for orthorexia has varied significantly (from 6% to 80%) in previous studies, and was almost 70% in the current study. These deficits must be corrected before the measure is used as it was intended: to diagnose individuals with orthorexia nervosa.

Conclusion

In sum, the data supporting the validity of the construct of orthorexia nervosa is still lacking. Previous studies conflict in regards to prevalence rates, the terminology that is used when discussing orthorexia, and even whether orthorexia is more related to an eating disorder, an anxiety disorder, or any disorder at all. The purpose of this study was to investigate the claims that have been made about taking healthy eating to extreme levels. Considering the numbers of overweight and obese Americans, along with the projected trend in the number of overweight individuals, it is clear that any emphasis on healthy behaviors should be promoted. At present, it appears that perhaps attempting to pathologize healthy eating behaviors would serve to the detriment of American society and detract from the positive changes society is making regarding mindsets and attitudes towards food.

The current study was the second study conducted on an American college population. The results of the study did find a relationship between self-reported symptoms of orthorexia nervosa and self-reported symptoms of disordered eating. The current study also found that there was no significant difference between the overall

number of orthorexia symptoms endorsed by men and women, which does not support the results of previous research. However, the cut-off was changed for the purpose of the present study, and the findings should not be generalized to other populations. Findings from other studies such as a positive correlation between BMI and orthorexia as well as with anxiety and orthorexia were not confirmed in the current study.

Study limitations such as a homogenous sample, using self-report measures, and the lack of adequate psychometric properties of the ORTO-15 should also be considered when interpreting the results of this study. Recommendations for further research on the topic of orthorexia should also be taken into consideration. A more varied sample should be used, in addition to more measures relating to anxiety, body dissatisfaction, and health concern. Differences in culture, and other characteristics of populations that vary between studies should also be a focus of future research. Finally, the ORTO-15 scale itself should no longer be used in research on orthorexia—a new scale should be developed. It is clear that the ORTO-15 was developed with little regard for the basic tenets of test construction. Additionally, a formal operational definition of orthorexia nervosa should be developed. Until then, rather than asking “what kind of disorder is orthorexia nervosa?” it may be necessary to consider whether orthorexia is a disorder, a socially constructed idea, or a positive trend in American society.

Appendix A

Bratman's Self-Test for Orthorexia Nervosa

1. Do you spend more than three hours a day thinking about healthy food? (For four hours give yourself 2 points)
2. Do you plan tomorrow's food today?
3. Do you care more about the virtue of what you eat than the pleasure you receive from eating it?
4. Have you found that as the quality of your diet has increased, the quality of your life has correspondingly diminished?
5. Do you keep getting stricter with yourself?
6. Do you sacrifice experiences you once enjoyed to eat the food you believe is right?
7. Do you feel an increased sense of self-esteem when you are eating healthy food?
8. Do you feel guilt or self-loathing when you stray from your diet?
9. Does your diet socially isolate you?
10. When you are eating the way you are supposed to, do you feel a peaceful sense of total control?

Appendix B

Donini's ORTO-15

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

APPENDIX C

Consent form and Demographic Questionnaire

CONSENT TO PARTICIPIATE IN RESEARCH

College Student Behaviors Survey

You are invited to participate in a research study conducted by Sonia Shah and Dr. Russell Gruber from the Psychology Department at Eastern Illinois University. Your participation is completely voluntary. Please ask questions about anything you do not understand before deciding whether or not to participate. Any introductory psychology student who registers on-line for an available time slot has the option to participate in this study.

Purpose of the Study: This project examines many factors that contribute to college students' general well-being and mental health related to maintaining a healthy lifestyle. Specifically, it examines factors that relate to eating behaviors, anxiety-related behaviors, and life satisfaction, as well as seeking to identify factors that may contribute to concern about well-being.

Description and Explanation of Procedures: If you choose to participate in this study, you will complete a packet of surveys about your thoughts and feelings. These surveys will take approximately 30 minutes to complete. After completing the surveys, you will meet individually with a researcher to discuss the study and have the opportunity to ask any questions you may have. The researcher will review the completed questionnaires to ensure all items have been answered. The researcher will also describe the purposes of the study in further detail and provide referral information if it seems that any of the questions have raised concern about your well-being. All debriefing will take place individually to ensure confidentiality.

Potential Risks and Discomforts: The project involves no greater risks than those ordinarily encountered in everyday life. If you become upset while participating in the research, you may skip any question that upsets you or withdraw from participation entirely without penalty. Researchers will also be available during and after the study to speak with you if any of the questions cause emotional discomfort.

Potential Benefits: For your participation, you will receive 1.0 hours of subject pool credit that partially fulfills course requirements for PSY 1879. You will also receive a mini mental health screening and potential risks may be identified and information about local mental health resources will be provided. Your participation will also help others by providing important information that the primary investigator will utilize to develop further assessments for health-and-eating related behaviors.

Confidentiality: Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. All questionnaires are imprinted with a number that corresponds with the number placed on this informed consent form. The principle investigator will keep both of these forms in separate locked filing cabinets in an office. Three years after the completion of the study, the principle investigator will remove all information related to the study from the file cabinet and shred it.

Participation and Withdrawal: Participation in this research study is voluntary and not a requirement or condition for being the recipient of benefits or services from Eastern Illinois University. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind or loss of benefits or services to which you are otherwise entitled. You may also refuse to answer any questions you do not want to answer without penalty.

Questions? If you have any questions or concerns about this research, please contact: Sonia Shah, Principle Investigator, smshah@eiu.edu

If you have any questions or concerns about the treatment of human participants in this study, you may call or write:

Institutional Review Board
Eastern Illinois University
600 Lincoln Ave.
Charleston, IL 61920
Telephone: (217) 581-8576
E-mail: eiuirb@eiu.edu

You will be given the opportunity to discuss any questions about your rights as a research subject with a member of the IRB. The IRB is an independent committee composed of members of the University community, as well as lay members of the community not connected with EIU. The IRB has reviewed and approved this study.

I voluntarily agree to participate in this study. I understand that I am free to withdraw my consent and discontinue my participation at any time. I have been given a copy of this form.

Printed Name of Participant

Signature of Participant

Date

DEMOGRAPHIC QUESTIONNAIRE

Today's Date: _____

Current Age: _____

Gender: Male Female

What year are you?

 Freshman Sophomore Junior Senior Graduate Student

Major: _____ Minor (optional): _____

Ethnic Background:

 White/Caucasian Black/African American Hispanic/Latino Asian/Pacific Islander American Indian/Alaskan Native Other or Multiple Race/Ethnicity (specify): _____

How much do you weigh? _____

How tall are you? _____ feet and _____ inches

Do you drink alcohol? No YesOn a typical day you drink, **how many drinks** do you have? (one drink equals: 12 oz beer, 1 oz liquor (shot), 5 oz wine): _____Do you smoke cigarettes? No YesIf so, how many cigarettes do you smoke **each day**? _____Do you use any other drugs? No Yes

If yes, please specify _____ and how often? _____

APPENDIX D

BMI	Weight Status
Below 18.5	Underweight
18.5-24.9	Normal
25.0-29.9	Overweight
30.0 and Above	Obese

References

- Adams, S. A., Matthews, C. E., Ebbeling, C. B., Moore, C. G., Cunningham, J. E., Fulton, J., & Hebert, J. R. (2005). The effect of social desirability and social approval on self-reports of physical activity. *American Journal of Epidemiology*, *161*(4), 389–398.
- Aksoydan, E., & Camci, N. (2009). Prevalence of orthorexia nervosa among Turkish performance artists. *Eating and weight disorders: EWD*, *14*(1), 33.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (Revised 4th ed.). Washington, DC: Author.
- Arusoglu, G., Kabakci, E., Koskal, G., & Merdol, T. K. (2008). Orthorexia nervosa and adaptation of ORTO-11 into Turkish. *Turkish journal of psychiatry*, *19*(3), 283.
- Barlow, D. H. (2008). *Clinical handbook of psychological disorders: A step-by-step treatment manual*. The Guilford Press.
- Borgida, A. (2011). *In Sickness and In Health: Orthorexia Nervosa, the Study of Obsessive Healthy Eating* (Psy.D.). Alliant International University, San Francisco Bay, United States -- California.
- Bosi, A. T., Çamur, D., & Güler, Ç. (2007). Prevalence of orthorexia nervosa in resident medical doctors in the faculty of medicine (Ankara, Turkey). *Appetite*, *49*(3), 661–666.
- Bratman, S. (1997). Health Food Junkie: Obsession with dietary perfection can sometimes do more harm than good, says one who has been there. *Yoga Journal*, *136*, 42–46.

- Bratman, S. (2000). *Health Food Junkies: Overcoming the Obsession with Healthful Eating*. Broadway Books.
- Canpolat, B. I., Orsel, S., Akdemir, A., & Ozbay, M. H. (2005). The relationship between dieting and body image, body ideal, self-perception, and body mass index in Turkish adolescents. *International Journal of Eating Disorders, 37*(2), 150–155.
- Craig, B. M., & Adams, A. K. (2009). Accuracy of body mass index categories based on self-reported height and weight among women in the United States. *Maternal and child health journal, 13*(4), 489–496.
- Crisp, A. (2006). In defence of the concept of phobically driven avoidance of adult body weight/shape/function as the final common pathway to anorexia nervosa. *European Eating Disorders Review, 14*(3), 189–202.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of personality assessment, 49*(1), 71–75.
- Dixon, J. B., Dixon, M. E., & O'Brien, P. E. (2002). Body image: appearance orientation and evaluation in the severely obese. Changes with weight loss. *Obesity surgery, 12*(1), 65–71.
- Donini, L. M., Marsili, D., Graziani, M. P., Imbriale, M., & Cannella, C. (2004). Orthorexia nervosa: a preliminary study with a proposal for diagnosis and an attempt to measure the dimension of the phenomenon. *Eating and weight disorders: EWD, 9*(2), 151.
- Donini, L. M., Marsili, D., Graziani, M. P., Imbriale, M., & Cannella, C. (2005). Orthorexia nervosa: validation of a diagnosis questionnaire. *Eat Weight Disord, 10*(2), e28–e32.

- Erem, C., Arslan, C., Hacıhasanoglu, A., Orhan Deger, M. T., Ukinc, K., & Halil Önder Ersöz, M. T. (2004). Prevalence of Obesity and Associated Risk Factors in a Turkish Population (Trabzon City, Turkey). *Obesity, 12*(7), 1117–1127.
- Eriksson, L., Baigi, A., Marklund, B., & Lindgren, E. C. (2008). Social physique anxiety and sociocultural attitudes toward appearance impact on orthorexia test in fitness participants. *Scandinavian Journal of Medicine & Science in Sports, 18*(3), 389–394.
- Fairburn, C. G. (2008). *Cognitive behavior therapy and eating Disorders*. New York, NY: Guilford Press.
- Fendrich, M., Mackesy-Amiti, M. E., Johnson, T. P., Hubbell, A., & Wislar, J. S. (2005). Tobacco-reporting validity in an epidemiological drug-use survey. *Addictive behaviors, 30*(1), 175–181.
- Fidan, T., Ertekin, V., Isikay, S., & KIrpInar, I. (2010). Prevalence of orthorexia among medical students in Erzurum, Turkey. *Comprehensive psychiatry, 51*(1), 49–54.
- Food and Agriculture Organization. (2006). *The state of food and agriculture 2006* (Vol. 37). Food & Agriculture Org. Retrieved from <http://books.google.com/books?hl=en&lr=&id=76BLbxGS4k4C&oi=fnd&pg=PR6&dq=FAO+Agricultural+and+Development+Economics+Division,+2006&ots=r2KAjKVDg4&sig=yLI5SvsPcrU-8ie08-XeP-5vupA>
- Franco, S. (2010). *Obesity and the Economics of Prevention: Fit not Fat*. Organization for the Economic Cooperation and Development. OECD publishing.

- Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982a). The Eating Attitudes Test: psychometric features and clinical correlates. *Psychological medicine*, *12*(04), 871–878.
- Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982b). The Eating Attitudes Test: psychometric features and clinical correlates. *Psychological medicine*, *12*(04), 871–878.
- Godart, N. T., Flament, M. F., Perdereau, F., & Jeammet, P. (2002). Comorbidity between eating disorders and anxiety disorders: a review. *International Journal of Eating Disorders*, *32*(3), 253–270.
- Goodman, W. K., Price, L. H., Rasmussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., Heninger, G. R., et al. (1989). The Yale-Brown obsessive compulsive scale: I. Development, use, and reliability. *Archives of general psychiatry*, *46*(11), 1006.
- Halmi, K. A., Sunday, S. R., Klump, K. L., Strober, M., Leckman, J. F., Fichter, M., Kaplan, A., et al. (2003). Obsessions and compulsions in anorexia nervosa subtypes. *International Journal of Eating Disorders*, *33*(3), 308–319.
- Hewitt, P. L., Flett, G. L., Ediger, E., & others. (1995). Perfectionism traits and perfectionistic self-presentation in eating disorder attitudes, characteristics, and symptoms. *International Journal of Eating Disorders*, *18*(4), 317–326.
- Hoek, H. W. (2006). Incidence, prevalence and mortality of anorexia nervosa and other eating disorders. *Current opinion in psychiatry*, *19*(4), 389.
- Holben, D. (2010). Position of the American Dietetic Association: food insecurity in the United States. *Journal of the American Dietetic Association*, *110*(9), 1368–1377.

- Huddy, D. C., DAVID, C. N., & ROBERT, L. J. (1993). Relationship between body image and percent body fat among college male varsity athletes and nonathletes. *Perceptual and motor skills*, 77(3), 851–857.
- Hudson, J. I., Hiripi, E., Pope, H. G., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological psychiatry*, 61(3), 348–358.
- Kaye, W. H., Bulik, C. M., Thornton, L., Barbarich, N., Masters, K., & others. (2004). Comorbidity of anxiety disorders with anorexia and bulimia nervosa. *American Journal of Psychiatry*, 161(12), 2215–2221.
- Kinzl, J. F., Hauera, K., Trawegerb, C., & Kieferc, I. (2006). Orthorexia nervosa in dieticians. *Psychother Psychosom*, 75, 395–396.
- Knight, D., & Bratman, S. (2004). *Health food junkies: the rise of orthorexia nervosa—the health food eating disorder*. New York: Random House Inc.
- Korinth, A., Schiess, S., & Westenhoefer, J. (2010). Eating behaviour and eating disorders in students of nutrition sciences. *Public health nutrition*, 13(1), 32–37.
- Kruger, J., Bowles, H. R., Jones, D. A., Ainsworth, B. E., & Kohl, H. W. (2006). Health-related quality of life, BMI and physical activity among US adults (Ages; 18 years): National Physical Activity and Weight Loss Survey, 2002. *International journal of obesity*, 31(2), 321–327.
- Kummer, A., Dias, F., & Teixeira, A. L. (2008). On the concept of orthorexia nervosa. *Scandinavian Journal of Medicine & Science in Sports*, 18(3), 395–396.
- Mac Evilly, C. (2001). The price of perfection. *Nutrition Bulletin*, 26(4), 275–276

- Martins, M. C. ., Alvarenga, M. S., Vargas, S. V. ., Sato, K. S. C. ., & Scagliusi, F. B. (2011). Orthorexia nervosa: reflections about a new concept. *Revista de Nutrição*, 24(2), 345–357.
- Mathieu, J. (2005). What is orthorexia? *Journal of the American Dietetic Association*, 105(10), 1510–1512.
- McInerney-Ernst, E. M. (2011). *Orthorexia nervosa: Real construct or newest social trend?* University of Missouri-Kansas City. Retrieved from <https://mospace.umsystem.edu/xmlui/handle/10355/11200>
- O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol*. Retrieved from <http://psycnet.apa.org/psycinfo/2002-02965-002>
- Peterson, R. A., & Heilbronner, R. L. (1987). The anxiety sensitivity index: Construct validity and factor analytic structure. *Journal of Anxiety Disorders*, 1(2), 117–121.
- Polivy, J., & Herman, C. P. (2002). Causes of eating disorders. *Annual Review of Psychology*, 53(1), 187–213.
- Pollan, M. (2006). *The omnivore's dilemma: a natural history of four meals*. Penguin Pr. Retrieved from <http://books.google.com/books?hl=en&lr=&id=Qh7dkdVsbDkC&oi=fnd&pg=PA1&dq=pollan+2006+dilemma&ots=w8imrEC542&sig=i3KOvwJdN9JFX4HD7QumaKzYac>
- Ravaldi, C., Vannacci, A., Bolognesi, E., Mancini, S., Faravelli, C., & Ricca, V. (2006). Gender role, eating disorder symptoms, and body image concern in ballet dancers.

Journal of Psychosomatic Research, 61(4), 529–535.

doi:10.1016/j.jpsychores.2006.04.016

Rothman, K. J. (2008). BMI-related errors in the measurement of obesity. *International Journal of Obesity*, 32, S56–S59.

Sánchez, F. G., & Rial, B. R. (2005a). Orthorexia nervosa. A new eating behavior disorder? *Actas Esp Psiquiatr*, 33(1), 66–68.

Schwarz, N. (1999). Self-reports: How the questions shape the answers. *American psychologist*, 54(2), 93.

Segura-García, C., Papaiani, M. C., Caglioti, F., Procopio, L., Nisticò, C. G., Bombardiere, L., Ammendolia, A., et al. (2012). Orthorexia Nervosa: A frequent eating disordered behavior in athletes. *Eating and Weight Disorders: EWD*. doi:10.3275/8272

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. (1983). *Manual for the State-Trait Anxiety (STAI Form Y)*. Consulting Psychologists Press, Palo Alto.

Storch, E. A., Bagner, D., Merlo, L. J., Shapira, N. A., Geffken, G. R., Murphy, T. K., & Goodman, W. K. (2007). Florida obsessive-compulsive inventory: Development, reliability, and validity. *Journal of clinical psychology*, 63(9), 851–859.

Sundgot-Borgen, J., & Torstveit, M. K. (2004). Prevalence of eating disorders in elite athletes is higher than in the general population. *Clinical Journal of Sport Medicine*, 14(1), 25.

Swami, V., Frederick, D. A., Aavik, T., Alcalay, L., Allik, J., Anderson, D., Andrianto, S., et al. (2010). The attractive female body weight and female body dissatisfaction in 26 countries across 10 world regions: Results of the

International Body Project I. *Personality and social psychology bulletin*, 36(3), 309–325.

Thiel, A., Broocks, A., Ohlmeier, M., Jacoby, G. E., & others. (1995). Obsessive-compulsive disorder among patients with anorexia nervosa and bulimia nervosa. *The American journal of psychiatry*. Retrieved from <http://psycnet.apa.org/psycinfo/1995-18047-001>

Vandereycken, W. (2011). Media hype, diagnostic fad or genuine disorder? Professionals' opinions about night eating syndrome, orthorexia, muscle dysmorphia, and emetophobia. *Eating Disorders*, 19(2), 145–155.

Yumuk, V. D. (2005). Prevalence of obesity in Turkey. *Obesity reviews*, 6(1), 9–10.