

EXAMINING THE RELATIONSHIP BETWEEN  
ORTHOREXIA NERVOSA AND  
PERSONALITY TRAITS

A Thesis Presented to the Faculty  
of  
California State University, Stanislaus

In Partial Fulfillment  
of the Requirements for the Degree  
of Master of Arts in Psychology

By  
Deborah S. Forester  
December 2014

CERTIFICATION OF APPROVAL

EXAMINING THE RELATIONSHIP BETWEEN  
ORTHOREXIA NERVOSA AND  
PERSONALITY TRAITS

by  
Deborah S. Forester

Signed Certification of Approval Page  
is on file with the University Library

---

Dr. Lin Myers Jovanovic  
Professor of Psychology

---

Date

---

Dr. Victor Luevano  
Associate Professor of Psychology

---

Date

---

Dr. Dawn Strongin  
Professor of Psychology

---

Date

© 2014

Deborah S. Forester  
ALL RIGHTS RESERVED

## DEDICATION

For Mom, Dad, and Peggy—I know you have been with me in spirit throughout this entire process. I love you, and miss you every day.

## ACKNOWLEDGEMENTS

It is with sincere and heartfelt thanks that I extend my gratitude to the following individuals. First and foremost, Dr. Lin Myers Jovanovic for your expertise, support, encouragement, and tireless dedication to the completion of this project; I could not have asked for a better Thesis Chair. I sincerely appreciate all of your time and effort, not only in the form of your expertise, but for all of the amazing and wonderful opportunities you brought my way. It has been my pleasure to not only be your student, but your Research and Teaching Assistant as well. I am truly grateful for all of the knowledge you have imparted; because of you, I am prepared to go forward into my new career as a College Professor. Thank you for the good talks, the moments of laughter, and just being the amazing woman that you are! Second, I want to thank my Thesis Committee, Dr. Victor Luevano and Dr. Dawn Strongin, for your willingness to be a major part of this endeavor. Dr. Luevano, I sincerely appreciate not only your input and support on this project, but I am also extremely grateful for the opportunities you allowed me to have as your Teaching Assistant. I can truly say that through your high expectations of me, along with your perfect guidance, I am prepared to teach. I am also extremely appreciative of the time you spent with me going over my statistical analysis, not only with this thesis, but in your Advanced Stats class, as well. I learned so very much from you, and as such, have a much better grasp of statistical analysis concepts. I have enjoyed getting to know you, your lovely wife, Kelly, and your beautiful baby daughter, Indy. Thank you for allowing me to

share that part of your life with you! Dr. Strongin, you have been such a strong support system to me. Not only have you encouraged me when I most needed it, but you have inspired me to keep going. Your belief in me, and your continuous positive attitude allowed me to believe that I can do anything. Your excitement about this project helped me to remain excited during the difficult and grueling times. Thank you so much for being part of my committee; it made this process so much easier!

Third, I want to extend my gratitude to the following professors for all of their support, encouragement, and tireless efforts to help me succeed: Professor Joel Murphy, Dr. AnnaMarie Guichard, Dr. Gary Williams, Dr. William Potter, Dr. Gary Gargano, Professor Jennifer McBride, Dr. Alissa Ackerman-Acklin, Dr. Irene Beattie, Dr. Brent Saich, Professor Bob Davies, Professor Keith Law, Dr. Marie Bruley, Professor Megan Igo, Dr. Jim McDiarmid, Dr. Anna Song, Dr. Rose Scott, Dr. Kris Koehler, Professor Derek Merrill, Dr. Paul Almeida, and Professor Vince Piro. Each one of you has contributed to my success over the past seven and a half years in a unique and special way. Through your willingness to impart your expert knowledge, I am fully prepared to pursue my career. I would also like to thank Galdina Serrano, in that I sincerely appreciate your assistance and willingness to go the extra mile every time I came into, or called the office with questions. You always made me feel welcome and never complained, even when you were ridiculously busy! Thank you for being such a great help to me during this arduous process. Also, Loretta Blakeley, for your willingness to take the time to sit with me to make sure this document was correctly formatted. You were a great help to me! I also want to extend

my deepest thanks to Kyle Hamilton and Katie Coburn for all of the help and assistance you have given me regarding my endeavors with all of this. I am sincerely grateful for the many hours you both spent with me helping me survive Advanced Stats; I could not have gotten through it without you! Thank you, Kyle, for suggesting I apply to Stan State; none of this would have been possible had I not taken your great advice! My Stan State cohort, Yvette de Los Santos, Nikki Walker, Joel Kennedy, Misty Jones, and Celeste Myers, my deepest thanks to all of you for the friendship, the support, the long talks, the hugs, and the good laughs we had over the course of the last two years. You will always be close to my heart! I wish each of you the greatest of success!!

To my family and friends, my gratitude runs deep. There are too many of you to mention here, so please know how important you all are to me, and how much I value you. First, I want to thank my dear son, Jason, who has literally sacrificed many hours of biding time while I studied, worked on this thesis, wrote papers, did assignments, graded assignments, tutored, etc. I know this has been rough on you at times, and I want you to know that I appreciate you hanging in there while I got through it. Our lives will be so much better now that this process is completed! I love you with all of my heart! Samantha and Jeremy Robinson, Alex Hoffman, Sean, JoAnne, and Lacey Hoffman, and Stephanie Sancibrian, thank you for being my “family”. You have all walked through fire with me over the past decade, and on many an occasion, I don’t know what I would have done without you. My feelings for each and every one of you run very deep, and no matter what happens, no matter

where our paths take us, I will always love you, and hold all of you, including sweet little Emma, and adorable James, close to my heart—you will always be my “family”. To my closest, and dearest friend, Rebecca Rodriguez Lincoln, my eyes fill with tears when I think of how much you have done for me. I sincerely could not have gotten through this without your friendship, support, and belief in me. I have no words to tell you how much you and your beautiful daughter, Morgan, mean to me. I am forever grateful, and deeply humbled at your continued support and encouragement. Never have you failed me; I only hope I can truly return the friendship that you have so selflessly given to me. My Blue Devil/Bobcat Sisters Forever, Heather Hernandez, Hillary Brown, Palei Taylor, Shirley Dismuke, Catherine Linville, Jenni Kiser, Heather Buchanan, and Erin Roberts, even though we have taken very different paths, and as such, don’t get to see each other very often, know that I value and treasure your friendships and sisterhood deeply—you will always be my Blue Devil/Bobcat Sisters, and that is a bond that can never be broken!! I’m so proud of all of you!!

I am sincerely grateful to ALL of those who have been present in my life at one time or another, cheering me on every step of the way, especially over the course of the last few years. You know who you are; please know that none of you are forgotten. I have carried each and every one of you in my heart through this process. Thank you for being there for me, encouraging me, cheering me on, and not letting me give up, even when times were rough. Here’s to many more years of friendship and success to us all!!

## TABLE OF CONTENTS

	PAGE
Dedication .....	iv
Acknowledgements .....	v
List of Tables .....	xi
Abstract .....	xii
 CHAPTER	
I. Introduction and Literature Review .....	1
Evolutionary and Historical Context of Eating Behavior .....	1
Health Issues in America .....	2
Diet and Health Fads .....	3
Patterns of Disordered Eating .....	19
Orthorexia Nervosa .....	37
Personality and Eating Behavior .....	58
The Present Study .....	73
II. Methodology .....	76
Participants .....	76
Measures and Materials .....	76
Procedure .....	79
Data Analysis .....	80
III. Results .....	81
Demographics .....	81
ORTO-15 Eating Behavior Scale .....	84
NEO Five-Factor Inventory-3 (NEO-FFI-3) .....	86
Hypotheses .....	87
Exploratory Analysis of Domains of O, E and A .....	88
Multiple Regression Analysis .....	89
IV. Discussion .....	90
Summary of Results in Relation to Previous Research .....	90
Strengths and Limitations .....	96
Future Research .....	99

References.....	103
-----------------	-----

Appendices

A. Consent Form.....	136
B. Demographic Questionnaire .....	138
C. ORTO-15 Eating Scale .....	144
D. The NEO Five-Factor Inventory-3 (NEO-FFI-3) .....	146
E. Debriefing Sheet .....	149

## LIST OF TABLES

TABLE	PAGE
1. Participant Eating Behavior Diagnoses as a Percentage of the Sample.....	83
2. Participant Eating Behavior Habits as a Percentage of the Sample.....	84
3. Intercorrelation of Scores on the ORTO-15 and NEO-FFI-3 .....	88

## ABSTRACT

As civilization has evolved, so have the patterns of dietary consumption. Many of these patterns are pathological in nature, and as such, threaten man's very existence. One such form of eating pathology is that of Orthorexia Nervosa (ON), an unhealthy obsession with healthful eating. The present study is designed to examine how various eating habits have evolved, and relationships between Orthorexia Nervosa and the personality traits of Neuroticism (N) and Conscientiousness (C), along with exploratory analysis of Openness to Experience (O), Extraversion (E), and Agreeableness (A). A sample of 441 participants were recruited through Amazon Mechanical Turk and California State University, Stanislaus SONA system, and were administered the ORTO-15 eating behavior scale and the NEO-FFI-3 personality scale. Results indicated that 198 (49.7%) of the participants presented with orthorexic symptomology. It was also determined that there is a strong negative correlation between ON and N ( $r = -.25$ ), a marginal negative correlation between ON and O ( $r = -.09$ ), but no correlation between ON and C ( $r = -.02$ ), E ( $r = .09$ ), and A ( $r = .03$ ). Multiple regression analysis indicated that N is a significant predictor of ON symptomology, along with age. Caution should be used when generalizing these results, as the ORTO-15 measure may be compromised due to over-translation from European languages to American, as well as questionable construct validity. Further investigation is advised with intent to re-evaluate the ORTO-15, as new questions should be considered, and more studies are needed using American samples.

## CHAPTER I

### INTRODUCTION AND LITERATURE REVIEW

#### **Evolutionary and Historical Context of Eating Behavior**

Since the beginning of existence as we know it, all life forms have required food and water in order to sustain life; without such, one would certainly perish. It is a physiological necessity that the human race must consume a variety of foods in order to survive. Coupled with breathing, the act of consuming food is quite possibly one of the most essential human activities (Mintz & DuBois, 2002).

During the prehistoric era, man met these basic needs primarily through hunting and gathering; food was scarce, thus requiring our Paleolithic ancestors to expend a great amount of physical energy in order to survive. With the industrialization of modern society, and mass produced food, humans have an extreme number of food choices compared to their ancestors; we need go no further than the corner store to restock our household goods. Seeing as how we are still genetically adapted for a nomadic hunter-gather lifestyle, this has proven problematic because today we only expend approximately 38% per kg in energy of that of our prehistoric ancestors (Hambrecht & Gielen, 2005). As food has become more easily obtainable, our means of gathering food require less and less effort. As a result, our caloric intake is increasing while our physical activity is decreasing, thus causing our waistlines to expand at an alarming rate (Hambrecht & Gielen, 2005), and with that a plethora of health issues.

## **Health Issues in America**

It is common knowledge that obesity in the United States has reached epidemic proportions, and despite efforts to educate the American public in an attempt to eradicate this problem, it continues to escalate (Epstein et al., 2001). According to the Centers for Disease Control and Prevention (CDC), approximately 35.7% of adult Americans fall into the obesity category, along with 17% of children and adolescents (Centers for Disease Control and Prevention, 2011; Ogden, Carroll, Kit, & Flegal, 2012). This trend has been steadily increasing over the last 20 years (CDC, 2011; Menifield, Doty, & Fletcher, 2008; Ogden et al., 2012), and obesity rates continue to remain high. Obesity has been positively correlated with devastating illnesses such as heart disease, stroke, Type II Diabetes, and many forms of cancer (Epstein et al., 2001). In 2008, medical expenses related to obesity were estimated to be around \$147 billion, and today costs continue to soar with estimates in the range of \$168 billion (CDC, 2011; Ogden et al., 2012).

In response to this overwhelming problem, a great deal of research and media attention has been devoted to discovering the roots of obesity and encouraging individuals in the direction of healthier habits. As a result, many Americans are attempting to change their lifestyles through the adoption of healthier eating habits, exercise, and stress management techniques. Through a variety of sources, such as health clubs, fitness magazines, information campaigns, and the media, individuals are becoming more and more exposed to a plethora of information regarding ways to improve their diets. As such, it has become more than apparent that healthy eating can

lower one's risk for obesity and the consequences that accompany it. Thus, it is apparent that the types of foods individuals consume are associated with their health behaviors. (e.g., Altekruse, Timbo, Headrick, & Klontz, 1995; Frank, Winkleby, Fortmann, & Farquhar, 1993; Phillips, 1975; Shepherd & Dennison, 1996; Slattery et al., 1991).

### **Diet and Health Fads**

Although progress in the United States has been slow compared to other countries (Babic-Zielińska, 1996; Boeing et al. 2012; Lappalainen, Kearney, & Gibney, 1998; Mintz & Dubios, 2002), as the awareness levels in U.S. have increased, many individuals are taking a closer look at what is being presented to them in the form of food choices and options. More and more consumers of all ages and lifestyles are leaning towards foods that are organic, unprocessed, and chemical and pesticide-free in hopes that they will reap the health benefits touted by those who promote them (Babic-Zielińska, 1996; Grobe & Raab, 2004). Schifferstein and Oude Ophuis (1998) found that individuals who consume organic foods on a regular basis take better care of their health, do not claim to have serious health problems, have a stronger grip on nutritional knowledge, and consider the consumption of organic food that of a lifestyle. People in the U.S. are now consuming more fresh-water fish, organic fruits and vegetables, whole grains, and cutting back on red meat in an attempt to avoid harmful and toxic ingredients (Babic-Zielińska, 1996). Although reports regarding the nutritional differences, growing methods, and health outcomes between organic versus non-organic foods are conflicting at times, there is evidence

that depending on the specific nutrient, situation, or condition evaluated, the overall value of organic foods is somewhat better for overall health (Herencia, Garcia-Galavis, Ruiz Dorado, & Maqueda, 2011; Magkos, Arvaniti, & Zampelas, 2006; Palupi, Jayanegara, Ploeger, & Kahl, 2012; Smith-Spangler et al., 2012; Williams, 2002; Williamson, 2007).

This trend toward strictly healthy eating began in the 1980s, resulting in the development of restrictive dietary choices such as vegetarianism, Raw Foods Theory, macrobiotics, and Paleolithic diets, as well as many others. Each approach claims to have the secret to ultimate healing, anti-aging properties, and overall wellness (Bratman & Knight, 2000).

### **Vegetarianism**

Considered the most well known form of alternative eating behavior, the movement itself began in the 1840s with the founding of the Vegetarian Society in England. It was at this time that the term 'vegetarian' was coined (Largen, 2009). Evidence of vegetarianism may date as far back as early man (Phillips, 2005; Spencer, 1994; Wilson & Ball, 1999). Vegetarianism evolved in the U.S. as a response to moral and political issues as part of the counter-culture movement in the 1960s and 1970s. Individuals become vegetarians for a variety of reasons, such as health consciousness, social awareness, financial limitations, morality, and ethics (Phillips, 2005). For example, there may be financial limitations or health issues that might prompt one to eliminate certain food products from one's diet. Religious convictions may also be at play here, with the emphasis on those who posit that the

roots of vegetarianism are steeped in Christian tradition (Largen, 2009). However, the primary reasoning for this type of restrictive eating behavior appears to be respect for the lives other living creatures; thus, the thought process behind it is that it is a more humane form of consumption (Devries, 2012; Donini, Marsili, Graziani, Imbriale, & Cannella, 2004; Largen, 2009). It seems that social awareness is at the root of this movement.

Despite the large amount of press received over the years, its popularity is not as vast as one would think. According to Riley (2004), the percentage of self-proclaimed vegetarians in the U.S. and the U.K. as of the mid 1990s combined was less than 8%. A recent poll conducted by the Vegetarian Resource Group of 2,397 adult Americans indicated that 3% fall into the category of vegetarians; this comes out to roughly 6 – 8 million adults (Vegetarian Resource Group, 2009). According to Devries (2012), 43% of them fall into the eighteen-to-thirty-four-age group, with 18% being college students. As individuals continue to become more health conscious and concerned about their environment, it is possible that these numbers may increase.

Individuals who decide to pursue Vegetarianism have been known to progress through developmental stages, which in some ways may be considered a sequential career process (Becker, 1963, as cited in Boyle, 2007). Stages range from early-stage vegetarianism to that of mature, long-term vegetarianism. During these stages the individual's eating patterns and motives shift through a maturation process (Boyle, 2007).

Vegetarianism has also been likened to a form of deviant behavior (Beardsworth & Keil 1992, 1997; Maurer, 1997; McIntosh, 1996; Spencer, 1995; Stiles, 1998; Willard, 1997, as cited in Boyle, 2007) in that it is considered a violation of social norms in respect to the traditional meat-and-potatoes style of eating behavior. Drawing on Matza's theories regarding deviance (Matza, 1969, as cited in Boyle, 2007), Boyle (2007) suggested that these developmental stages as they pertain to deviance are made up of three phases: affinity, affiliating, and signification. Affinity occurs when the individual becomes attracted towards vegetarianism. Affiliation occurs when the individual begins to educate themselves on the various aspects of vegetarianism. Finally, signification occurs when the individual has completed all steps necessary to actually become a vegetarian.

As previously stated, many individuals usually choose a diet of this nature for ethical and moral reasons. Those who express this reasoning are concerned that there is inhumane treatment of cows, chickens, and other animals raised for consumption purposes (Devries, 2012; Largen, 2009). Climate change and how livestock farming may be a significant contributor to this through the emitting of methane gas, is another concern. According to Devries (2012), 18% of greenhouse gas emissions are generated from this practice. Another concern that has arisen since the 1980s is that of the increase in foodborne illness, specifically in meat products, which has led to the overuse of antibiotics in factory farming (Devries, 2012). It is important to note that foodborne illness is not restricted to meat products. In fact, according to the CDC, in 2011 a multitude of food-borne illness outbreaks were found to be the result

of tainted produce (CDC, 2011). Regardless, it is well known that those who work in slaughterhouses are exposed to one of the most dangerous jobs in America, thus contributing to the increase of medical expenses related to injuries and fatalities due to the unsafe work conditions which may be another contributing factor as to why some individuals profess a vegetarian lifestyle (Devries 2012).

There are several categories of vegetarianism. First, and the most restrictive form of vegetarianism, are vegans (total vegetarians). According to a recent study (Vegetarian Times, 2008), 0.5% of those living in the U.S. are vegans. Vegans eliminate large classes of foods that are considered harmful in an attempt to purify their diet (Donini, et al., 2004). Those who follow this protocol completely avoid any products that are derived from animals, including eggs, dairy products, and gelatin. Second, there are lacto-vegetarians, or Lactos who also avoid all meat, poultry, fish, and eggs, however they do consume dairy products. Third are lacto-ovo vegetarians, or Lacto-ovos who also avoid all meat, poultry and fish, however, eggs and dairy products are allowed. Finally, there are partial vegetarians, or Partials who basically avoid meat, however, they may consume fish or poultry, along with dairy products and eggs (Harvard Women's Health Watch, 2009).

Overall, as long as the vegetarian diet is appropriately planned, it is considered by most experts to be healthful and nutritionally adequate, and may provide health benefits, such as lowering one's risk for heart disease, some cancers, and Type II Diabetics (Harvard Women's Health Watch, 2009; Largen, 2009; Phillips, 2005). However, despite the health benefits touted by those who follow these

regimes, there is concern that some of those who faithfully follow a vegetarian diet may be prone to some nutritional deficiencies (Phillips, 2005). For example, 75% of vegans consume less than the recommended daily amount of calcium, as well as insufficient amounts of Vitamin D and Vitamin K, and vegans in general are prone to a high rate of fractures. Lacto-ovo's, however manage to consume as much calcium as meat eaters, thus allowing them to protect bone health. Lacto-ovo's are also able to obtain the necessary amount of protein required, although vegans are able to meet their needs through a variety of plant sources. Vitamin B<sub>12</sub>, on the other hand, is only found in animal products; thus vegetarians who follow a strict regime must supplement this nutrient, either in the form of fortification, or in pill form. Iron is another problem in that the type of iron found in meat is more readily absorbed than that found in plant foods, therefore it is important that there is a balance of nutrients such as Vitamin C along with the iron to increase absorption. Phytic acid that is found in whole grains, beans, lentils, seeds, and nuts also inhibits iron absorption, as well as zinc absorption. Furthermore, those who avoid fish or eggs may be at risk for Omega-3 fatty acid deficiencies. Therefore, supplementation of some sort is usually necessary here (Harvard Women's Health Watch, 2009).

### **Raw Foods Theory**

As its name implies, the raw foods theory posits that all food consumed should be done so in its purest and most natural form, that of course being raw—raw fruits, raw vegetables, and even including raw grains (Bratman & Knight, 2000; Phillips, 2005). It is an intuitive, spiritual, and somewhat religious concept of a

Tantric nature (Living-Foods, 2002) that is followed within many cultures. This theory originated from the views of Jean-Jacques Rousseau in early 19<sup>th</sup> century Europe as a revolt against industrial forms of food production transformation, and may actually be considered the first back-to-nature movement of its kind. As its popularity spread across Europe, the U.S. was not far behind in its adoption of such practices. The natural health movement of the 1960s that we are familiar with today is the direct antecedent of contemporary alternative medicine, organic farms, natural foods in general, and environmentalism (Bratman & Knight, 2000).

At the heart of this movement lies the concept of natural health philosophies that take on a vast array of titles such as Natural Medicine, Nature's Law of Healing, Natural Cure, Natural Hygiene, and ultimately, Naturopathy. Note that the word "nature" is at the core of each of these names. It appears that these types of natural healing actually began with a focus on raw foods; however modern naturopathic physicians do not place as much emphasis on a raw food focus as in the past. Today practitioners are more apt to use herbal and food supplementation instead (Bratman & Knight, 2000).

One claim of raw food theorists that has come under fire by the scientific community is the claim that raw foods contain enzymes that are of high nutritional value to the body that are destroyed when the food is cooked (Living-Foods, 1998). However, this claim has been sufficiently refuted (Wellness, 2014). Once the raw food has been ingested, acids in the stomach curdle these enzymes, thus rendering them ineffective in a raw state. In fact, there are many foods that require a necessary

amount of cooking in order to release enzymes that the body needs (Beyond Vegetarianism, 1999). Therefore, this argument posed by raw food theorists is considered nothing more than outdated 19<sup>th</sup> century scientific theory, and is merely being touted as a distraction from the real reasoning behind raw food theory, that of it being more of a spiritual or religious quest than a health quest (Bratman & Knight, 2000).

The language of raw food theory is expressed by some in the form of Christian overtones, specifically that of returning to the ways of righteousness through living in harmony with nature's laws (Bratman & Knight, 2000). In this case, the path to righteousness is that of food consumption in its purest form, that being raw. This enables the follower to return to Eden, to become one with the earth and its sustenance. It is believed that since our earliest ancestors lived completely on fruits, leaves, shoots, roots, seeds, and nuts, anything beyond that is literally sacrilegious, and in fact, only contributes to man's further decline. Cooking foods and consuming meat are considered a poison to the human condition and the ultimate sin one could commit against nature and its divine creator.

In its extreme form, raw food theory leads those who follow it to pursue what is known as a feeling of lightness—to float free from the earth's weightiness as if one is as transparent as an angel. It is as if they wish to disengage from their physical bodies. This is achieved through the consumption of fruits, vegetables, nuts, and raw grains. Ultimately a progression ensues wherein the raw foodist eventually consumes only fruit, known as fruitarianism, which has been described by those who follow this

path as exhilarating. Even more extreme are those who engage in breatharianism, a practice that involves living on breath or energy alone (Klimo, 2008). The majority of raw foodists do not reach this extreme, however it is important to note that it is a possibility for those with personalities that border on extremism, thus making this practice very dangerous in that it can lead to severe malnutrition, and possibly death (Bratman & Knight, 2000).

### **Macrobiotics**

The Macrobiotic Diet was first introduced to the West in the mid-20<sup>th</sup> century by George Ohsawa and popularized by Michio Kushi in the early 1950's, and remains one of the most prominent forms of Eastern dietary thought here in the United States (Bratman & Knight, 2000). Rooted in ancient Chinese teachings and medical theories, and contrary to the purist cleansing idea behind Raw Food Theory, macrobiotics teaches that foods should be used to achieve balance (American Academy of Pediatrics, 1977; Sebelis, 1996). Drawing on the concept of the classic Taoist principle of yin and yang, foods are considered either healthy or unhealthy depending on how they are used (Sebelis, 1996), and moderation is the key. Theorists teach that we naturally and unconsciously seek this balance in our diets. This is their explanation for the Western diet, which consists of a continuum between meats, cheeses, and refined salts, (i.e., yang), which then leads one to crave sweets and fats (i.e., yin); eating macrobiotically places one on a more moderate path of eating, and extremes such as seen in the Western diet are avoided. According to its proponents all foods possess energy, and individuals deficient in that specific energy should

consume that specific food. Therefore, if one is not deficient in a specific energy, one should not consume that food. All food has good energy, with the exception of one type: raw foods. According to macrobiotics, raw foods are believed to be detrimental to one's health, and can even contribute to diseases such as arthritis and cancer. It is believed that cooking and seasoning increases the yang of the food while the opposite practice, in this case not cooking, increases the yin. As previously stated, macrobiotic followers believe that raw foods contain bad energy; therefore when too many raw foods are introduced, an overabundance of yin appears creating an imbalance between the yin and the yang (Bratman & Knight, 2000; Sebelis, 1996).

One key aspect of macrobiotics is the need for strict control. It is here that environmental factors come into play with regard to the way one is supposed to eat. In order to balance the yin and the yang, more root vegetables are eaten in fall and winter, whereas more leafy greens are consumed when the weather is hotter; the type of grains consumed are also determined by the seasons as well. Therefore, foods should not be transported long distances, but instead should be grown and consumed locally in season, thus keeping nature's balance of yin and yang intact. It is also necessary to weigh and measure the foods, slice them in the right way, and cook them to precision, all in an attempt to keep the balance. Not only that, the level of physical activity also dictates the choice of diet—the more physically active one is, the more grains one should consume, and vice versa (Bratman & Knight, 2000; Sebelis, 1996).

Another contrast between macrobiotics and raw food theory is that of fasting; raw foodists will fast primarily on water with the intent to achieve transparency and

lightness, whereas with macrobiotics, brown rice is the food of choice for a fast. Eating bowls of rice leaves the faster feeling full, thus achieving the purpose of being more deliberate, practical, and grounded (Bratman & Knight, 2000).

It is important to note and emphasize that macrobiotics focuses mainly on Japanese foods. This in itself creates a problematic scenario since some of the foods that are considered the best for the diet are not easily obtained in many locales throughout the world. Therefore, it appears that the roots of the diet are based more on an ethnic preference promulgated by the lifestyle that Kushi was accustomed to as a child than that of a realistic way to eat for the rest of the world. Furthermore, the philosophy itself is merely a creation of Ohsawa, and not a direct representation of the ancient teachings of Asian traditions, which are nowhere as strict as the regimented ideals proposed today. Instead, the strictness itself may stem from an underlying emotional agenda giving those who follow it a sense of mastery and self-control down to the smallest detail as it pertains to food selection and preparation. By achieving this sense of mastery, it is their belief that they have achieved a feeling of power in all areas of their lives (Bratman & Knight, 2000).

Due to the restrictive nature of the macrobiotic diet, some dangerous drawbacks and consequences have been known to arise such as dehydration and vitamin deficiencies, specifically that of B<sub>12</sub> (American Academy of Pediatrics, 1977; Phillips, 2005). This is due to the fact that macrobiotics is a form of non-dairy vegetarianism—basically it is veganism in its purist form. With the absence of animal products, Vitamin B<sub>12</sub> is literally non-existent; it is nearly impossible to get enough

from plant foods alone. This, along with fluid restriction, can lead to serious health consequences. Ironically, with proper hydration and vitamin supplementation, macrobiotics can be a healthy alternative, as it is now well-known that consuming a diet of predominantly whole grains, vegetables, and soy can potentially cut one's risk of many diseases (American Academy of Pediatrics, 1977; Phillips, 2005). It is only when the emotional and spiritual aspects of macrobiotics enters the picture that it becomes dangerous. Bratman and Knight (2000) contend that one's kitchen literally becomes a shrine; the preparation of food and the act of eating becomes a sacred ritual that overshadows the joy and spontaneity of living.

Ultimately, as indicated, and similar to that of raw food theory and vegetarianism, large classes of food that are considered harmful are eliminated from the diet, also in an attempt to achieve some form or another of purification and/or balance (Bratman & Knight, 2000; Donini, et al, 2004).

### **The Zone/Paleolithic Diets**

The Zone diet itself is quite similar in the approach touted by the Atkins diet—that of eliminating a vast majority of carbohydrates while allowing animal proteins and fats. Founded by Barry Sears, this diet professes weight loss, the prevention of illness, increased vitality, and immense anti-aging powers (Bratman & Knight, 2000). The theory is based on curbing excessive insulin levels that are produced in the body when one consumes starchy foods, which lead to symptoms of hypoglycemia, primarily fatigue, mental fogginess, and weight gain. Despite Sears' enthusiasm as to the effectiveness of this diet, his reasoning and theoretical standpoint

are speculative and questionable. To date there is no sound empirical evidence to support what he claims in regard to longevity; in fact, only the Mediterranean diet has been scientifically supported in this regard, which, contrary to what Zoners allow, includes a diet of whole grains, along with fruits, vegetables, and essential fatty acids (Bratman & Knight, 2000).

As in eating philosophies previously discussed, the Zone can become a way of life for many, and can be taken to extremes. Taken one step further, there are theoretical underpinnings of the Zone that point toward the idea that our eating practices should specifically follow that of our caveman ancestors. This is known as the Paleolithic form of dieting, also referred to as Paleo. It is here that Sears' viewpoint is somewhat accurate in that genetically we are literally still the same as our prehistoric ancestors (Hambrecht & Gielen, 2005); however, due to the introduction of agriculture and industrialization, our diets have changed over the course of time, with the emphasis primarily on grain consumption. The Paleo diet encourages the renouncement of grains, with the focus on consuming meats, raw fruits, and vegetables. The concept is to imitate as closely as possible eating behavior that was predominant with our ancestors (Bratman & Knight, 2000). With the exception of the allowance of meat, there is some similarity to the Raw Foods Theory in the spiritual sense of returning to a natural state of being, in this case, that of an earthy way of life (Bratman & Knight, 2000). Ultimately, large classes of food that are considered harmful are eliminated from the diet, also in an attempt to achieve

some form or another of purification and/or balance (Bratman & Knight, 2000; Donini, et al, 2004).

### **Food Allergies**

According to Bratman and Knight (2000) food allergies and treatment regimens to treat them can result in the elimination of specific foods from the diet. This in turn can lead to severe caloric restriction and nutritional deficiencies similar to those seen in diets previously discussed.

Over time the number of cases of food allergies has increased, presently affecting 15 million Americans (Food Allergy Research and Education, FARE, 2013). Food allergies present in one of two ways: (1) immediate onset which leads to symptoms such as hives and swelling of the lips, face, tongue and throat, and (2) gradual onset that develops over time with symptoms that are much more subtle. An example of the first type of food allergy would be a peanut or shellfish allergy, both of which can be fatal and require immediate attention. In contrast, the second form can take weeks, even months to develop as a result of a constant exposure to a food allergen. Symptoms can appear in the form of fatigue, respiratory problems, and headaches, as well as others. Vague and subjective symptoms of this nature make diagnosis and treatment difficult, as they can be the product of a variety of medical problems. Once the medical professional suspects that food allergens may be the issue, treatment can be extreme in that most foods will be eliminated from the individual's diet in order to first bring potential relief. From there foods are slowly readmitted into the individual's diet in order to determine whether or not there will be

a reaction. This food readmission process can take months, thus placing the individual in a nutrient deficient state, which in turn can lead to even more problems. This type of treatment is extremely arduous and requires a lengthy and strong-willed commitment on the part of the patient; thus it is difficult to follow. Therefore, other methods have been used, most of which are not completely validated. These methods include blood tests, skin electrical resistance tests, and applied kinesiology, and provide sometimes rather long lists of extremely specific suggestions as to which foods may be causing the allergic reaction (Bratman & Knight, 2000). Furthermore, despite definite advances that have been made using methods such as Skin Prick Tests (SPT) that are able to detect sensitization, thresholds differ between individuals, with sensitivity and specificity expressing at modest levels. Therefore, evidence is conflictive as to whether or not tests of this nature are completely accurate (Peters, Gurrin, & Allen, 2012).

Milk is the most common allergen, along with wheat. Wheat allergies have become more and more common, with emphasis on gluten intolerance being considered a major factor in Celiac Disease (Norström, Sandström, Lindholm, & Ivarsson, 2012). As a result, more and more individuals are pursuing a gluten-free diet with the intent to reduce gastrointestinal problems, as well as to lose weight, regardless of whether or not they have been diagnosed with this disease. Although the elimination of certain foods may in fact alleviate some if not all symptoms associated with problematic allergies, the problem arises when so many foods become restricted that nutritional deficiencies occur and food obsessive behaviors develop. It is often

the case that individuals will begin to see improvement for a time, however, problematic symptoms begin to emerge, thus leading to the elimination of more and more foods with the potential for other health problems (Bratman & Knight).

### **Summation of Diets and Health Fads**

Although each approach has its benefits, and many individuals have undergone drastic reversals in relation to negative health conditions as a result of adopting one or more of these dietary approaches, there has been much controversy as to the extent that an individual should go to in order to achieve wellness (Bratman & Knight, 2000). As concerns regarding one's body weight and appearance become more and more prevalent in Western society, trends of this nature are being seen not just in adults, but in young children as well when parents decide to restrict their diets (Shepherd & Dennison, 1996). This can be disastrous for young children as their dietary needs are different than those of adults. It is well known that extreme dietary restriction on a long-term basis with intent to alter one's appearance can have long-term health consequences, as well as set the stage for the development of eating disorders (Richards, Casper, & Larson, 1990). In some cases, an individual's efforts to achieve such levels of "wellness" can lead to improper food behavior known as "food faddism" (Babicz-Zielińska, 1996). It is here that one's lack of rationality towards healthy eating can become problematic and potentially lead to maladaptive eating patterns.

## **Patterns of Disordered Eating**

Once only seen in industrialized countries, various eating disorders are becoming more prevalent in many cultures where the Western image of the “ideal woman” has been introduced (Arusoğlu, Kabakçı, Köksal, & Kutluay Merdol, 2008, p. 1). Eating disorders, specifically in young women, regardless of the nature and orientation, are considered to be one the most debilitating psychiatric disturbances seen by mental health professionals (Klein & Walsh, 2003). Eating disorders have been defined as “persistent disturbance of eating behavior” (Klein & Walsh, 2003, p. 205), as well as behavior that is engaged in with the intent to control weight. This can then lead to the significant impairment of physical health or psychosocial functioning (Klein & Walsh, 2003). Eating disorders that have received status as psychiatric diagnosis include Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED), and Avoidant/Restrictive Food Intake Disorder (ARFID) (American Psychiatric Association, 2013), all of which will be discussed below.

Adolescence may be a time of the development of unhealthy and disordered eating. Teens may skip breakfast, eat quantities of junk food, overeat in general, or begin restrictive diets to lose or control weight, or choose restrictive eating due to moral or ethical concerns or how particular foods taste. The traditional family dinner has become a thing of the past in many cases due to many factors, including less time for busy working parents, after-school activities, etc., with more and more adolescents being left to their own devices after school and in the early evening. Furthermore, extracurricular activities, economic issues, and single-parent families

may also contribute to fractured eating patterns that are more commonly reported now. Exercise is not as prevalent either at school or afterwards. Pubertal changes bring more focus on the body, while media influences to have the perfect body abound. Coupled with issues of body image and weight control, a recipe for eating disorders is provided with such nutritional practices (Shepherd & Dennison, 1996).

The role vegetarianism plays in eating disordered behavior has been examined. Sullivan and Damani (2000) identified incidents of patterns specifically between those diagnosed with AN and vegetarianism, although it was not evident that the vegetarianism preceded the onset of AN in most cases. It was noted that an ample portion of those in recovery are known to cease vegetarianism practices at the end of treatment. Regardless of outcomes, overall, individuals who are diagnosed with an eating disorder, specifically AN, show significantly higher rates of vegetarianism as compared to the general population (Sullivan & Damani, 2000).

Regardless of the type of eating disorder, the central psychopathology shared by all who receive this diagnosis is an extreme preoccupation with body weight and/or body shape (van der Ster Wallin, Norring, & Holmgren, 1994). According to various studies, this is known as overvaluation, wherein an individual places an excessive influence on their shape or weight as it relates to their self-evaluation (e.g., Fairburn & Harrison, 2003; Grilo et al., 2008; Hrabosky, Masheb, White, & Grilo, 2007). It is important to note that overvaluation not be confused with body dissatisfaction, in that although some individuals may not be satisfied with their physical appearance, not all of them base their self-worth on that appearance, i.e.,

their shape or weight. Also, compared to body dissatisfaction, overvaluation has been more closely tied to self-esteem (Hrabosky, et al.; Masheb & Grillo, 2003), and has shown to better differentiate those with eating disorders from health control participants as compared to body dissatisfaction (Goldfein, Walsh, & Midlarsky, 2000; Hrabosky et al., 2007). With that stated, it is important to discuss each disorder in its own right, in order to understand the specific characteristics that underlie each one's etiology and progression.

### **Anorexia Nervosa (AN)**

Derived from the Greek *orexis*, meaning appetite, AN has been described as a nervous loss of appetite and was first mentioned in medical literature in the 1870s. Its main feature is that of extreme weight loss in the form of self-starvation (Patching & Lawler, 2009), and is considered a serious mental disorder with high morbidity and significant lifetime mortality, along with psychological disturbances that entail cognitive distortions of body image (Brockmeyer et al., 2013). Also present are the use of laxatives and possible purging through self-induced vomiting, as well as excessive physical activity such as exercise. This can result in amenorrhea, the growth of downy hair on the body, electrolyte imbalances, and possibly death. Its most striking identifier is that of the individual's relentless pursuit of becoming thin and a refusal to maintain a body weight that is considered the minimal standard for one's age, height, and optimal physical health. Also striking is the individual's extreme fear of gaining excess weight and becoming fat or obese, which then leads to the undue placement of value on weight loss, along with a disturbed perception of

body image and significant levels of shape and weight overvaluation (Geller et al., 1998; Hrabosky et al., 2007). One of the most common ways those diagnosed with AN lose weight is in the form of reducing portion sizes, as well as becoming rigid in dieting behaviors and food choices (van der Ster Wallin et al., 1994). Two clinical subtypes of AN have been recognized by the DSM-5 (American Psychiatric Association, 2013), the first is restricting, with the second being binge-eating/purging. Those diagnosed with restrictive AN achieve weight loss primarily through fasting or exercising excessively, whereas those diagnosed with binge-eating/purging AN use tactics such as self-induced vomiting or laxative abuse (Klein & Walsh, 2003). The incidence of AN is more prevalent amongst those who participate in the arts and fitness realms, such as dance, fashion modeling, and certain sports. Fields of this nature place a large emphasis on the need for an extremely low body fat percentage in order to achieve optimal performance standards or to look appropriate for that profession. As such, higher rates of eating disorders have been found in these realms, not only in women, but in men as well (Klein & Walsh, 2003).

Although no direct causality has been determined, some evidence has pointed to a multifactorial genesis, with the likelihood of biological, psychological, and environmental risk factors all playing a role in the development of AN. Genetic factors play a role in one's vulnerability and susceptibility to AN; more than 50% of its occurrence is attributed to some type of genetic factors. According to Klump, Kaye, and Strober (2001), family studies have indicated that the lifetime risk of AN in regard to female relatives of those with eating disorders is 7 to 20 times that of the

general population. Furthermore, Klump, Wonderlich, Lehoux, Lilienfeld, and Bulik (2002) indicated a higher concordance rate of AN in monozygotic twin pairs versus that of dizygotic.

Evidence indicates that AN patients tend to present with substantial comorbidities, specifically unipolar depression, anxiety disorders, and substance use disorders (Karatzias et al., 2010), as well as somatization (Adambegan et al., 2012). Furthermore, internalizing psychopathologies such as anxiety, depression, and somatization have been associated with the severity of restriction (Adambegan et al., 2012). AN along with obsessive personality traits, post-traumatic stress disorder, and schizophrenia spectrum disorders are also co-occurring (Karatzias et al., 2010). Research using structured diagnostic interview schedules or standardized assessment tools have established a strong link between AN, Obsessive Compulsive Disorder (Blinder, Cumella, & Sanathara, 2006; Karatzias et al., 2010) and anxious fearful personality disturbance (Karatzias et al., 2010; O'Brien & Vincent, 2003). Cluster analysis of subtypes of ED patients has identified three clusters: (1) impulsive/emotionally dysregulated; (2) anxious/compulsive; and (3) relatively high functioning/perfectionistic (Karatzias et al., 2010; Wonderlich et al., 2005), with AN patients frequently appearing in the second cluster (Goldner, Srikameswaran, Schroeder, Livesley, & Birmingham, 1999; Karatzias et al., 2010). It has been posited that perfectionism and rigidity and propensity for behavioral constraints are expressed through the disorder. According to Mitzman, Slade, and Dewey, (1994), neurotic perfectionism is considered a major predisposing factor that is contributive to the

emergence and maintenance of eating disorders. Those diagnosed with AN are careful, detail-oriented and keep reliable records of the eating patterns and food intake (van der Ster Wallin et al., 1994). Furthermore, according to Halmi et al. (2000), individuals who present with symptoms of AN are inclined to have personality and temperamental traits such as greater harm avoidance, conscientiousness, persistence, and perfectionism compared to those who do not present with AN. Srinivasagam et al. (1995) determined that perfectionism and obsessional symptomatology continue to be present, even after one has recovered from AN.

AN usually develops during adolescence and may be propagated by psychological reactions to environmental and social changes, pubertal changes, changes in peer relationships and new life roles, as well as stress in general. According to Shapiro, Newcomb, and Loeb (1997), children in the United States as well as the United Kingdom are showing signs of dieting and eating behavior issues as early as age eight. To compound the issue of physical changes, socio-cultural influences such as the media displaying images of women and men that are considered beautiful based on their slender and fit physiques only add to the promulgation of means to which such physical measures might be achieved. This is accomplished through various ads for diet regimens and fitness clubs, many of which promise the secret formula for obtaining the perfect body (Klein & Walsh, 2003). Initially this behavior may be compounded by social reinforcement in the form of approval from family and friends at one's attempt to lose weight in the event they

have been experiencing a weight problem. Eventually, continued efforts to lose weight may lead to extreme behaviors that involve social avoidance; those who engage in AN usually eschew situations where eating would be expected of them. Eventually their entire lifestyle revolves around rituals that are associated with exercise, eating, and work, leaving little or no room for social activities (Klein & Walsh, 2003).

Considered one of the most disturbing features of AN is that of distorted body image. Individuals who engage in this behavior sincerely believe that they are much heavier than they actually are which indicates significant cognitive dysfunction in accurately assessing body image. This may manifest in attention being given to one specific area of the body, such as the thighs or buttocks, rather than the entire body itself. As an individual with AN continues to starve in the effort to attain their perfect image, deficits in cognition are exacerbated, contributing to an irrational pre-occupation with food and body weight. This has led to extreme difficulty in the efforts to achieve successful psychotherapy with anorexics, in that altering cognitive distortions related to body image have proven to be one of the most important features to treatment and success in recovery.

According to Kaplan (2002) and Eisler et al. (1997, 2000), the most effective psychotherapeutic treatments for AN with regard to adolescents appear to be those that are family-based. Cognitive behavioral therapy has been shown to be moderately successful in preventing relapses (Klein & Walsh, 2003). Psychopharmacology is less likely to be used, however there are some encouraging preliminary reports in relation

to newer atypical neuroleptics, such as olanzapine. (Klein & Walsh, 2003; Mehler et al., 2001; Powers, Santana, & Bannon, 2002).

### **Bulimia Nervosa (BN)**

Derived from the Greek words *bous* and *limos*, respectively meaning head of cattle and hunger related to the appetite of an ox, reports of bulimia itself date back thousands of years to practices of vomiting after eating (Klein & Walsh, 2003; Nasser, 1993). In 1979 the clinical syndrome of bulimia nervosa was formally described, and was formally recognized as a disorder in the DSM-III in 1980 (American Psychiatric Association, 1980). Its main feature is that of recurrent episodes of binge eating which coincides with the consumption of large amounts of food coupled with subjective feelings of loss of control. This has been referred to as the binge/purge syndrome (Patching & Lawler, 2009). These episodes are associated with behavior that is conducive to avoiding weight gain, primarily that of self-induced vomiting, and are accompanied by the psychological feature of an over-concern with body image, specifically that of weight and shape overvaluation (Geller et al., 1998; Hrabosky et al., 2007). Also present is a preoccupation with eating and a strong compulsive desire to eat. Unlike individuals who suffer from AN, those who engage in BN behavior usually present with normal body weight. Two subtypes of BN behavior have been identified, purging or non-purging with the latter type engaging in excessive exercise or fasting in order to avoid weight gain. Clinical differences between the two groups have been found in that purging bulimics display

higher electrolyte disturbances, more psychiatric comorbidity, as well as lower body weight than non-purging bulimics (Klein & Walsh, 2003).

Although BN is more common than AN, as with AN, the majority of people seeking treatment are women. The disorder usually develops during late adolescence or early adulthood during or following a diet, with research supporting women born after 1960 having a higher risk of developing BN than those born prior to 1960 (Kendler et al., 1991; Klein & Walsh, 2003). The onset of BN is usually preceded by fasting or some sort of fad or crash diet (van der Ster Wallin et al., 1994), which is a common feature of Western cultures, with BN being more prevalent in Western cultures where food is plentiful, yet an ideal thin body image is esteemed (Klein & Walsh, 2003). The episodes of fasting and dieting can soon lead to even more restrictive forms of dieting and alternating with binge eating. In some cases bulimics will even omit complete meals as another weight loss alternative (van der Ster Wallin et al., 1994). A history of AN has also been cited as a risk factor for BN, as well as a shared component of environmental and genetic factors being present in that both AN and BN appear to occur in the same families (Klein & Walsh, 2003).

Unlike AN, those who present with BN are known to display a higher-than-expected prevalence of childhood and parental obesity, which is suggestive of a predisposition being present that may increase vulnerability to BN. Furthermore, those identified with BN report having experienced criticisms from family members regarding their weight, shape and eating patterns at an early age (Fairburn, Welch, Doll, Davies, & O'Connor, 1997; Klein & Walsh, 2003). They are also inclined to

report higher levels of anxiety and mood disorders, specifically that of Major Depressive Disorder and Dysthymic Disorder. Seeing as how affective disorders have been found in family members, a genetic diathesis for depression has been suggested which may contribute to the development of BN (Kassett et al., 1989; Klein & Walsh, 2003).

Personality traits in those diagnosed with BN include novelty seeking, impulsivity, and harm avoidance (Diaz-Marsa, Carrasco, & Saiz, 2000; Klein & Walsh, 2003). They are also known to report greater negative emotionality and stress reactivity (Klein & Walsh, 2003; Pryor & Wiederman, 1996), along with higher rates of personality disorders compared to those not diagnosed with BN (Bulik, Sullivan, Joyce, & Carter, 1995; Klein & Walsh, 2003). There may be a familial foundation at play here in that increased levels of perfectionism and stress reactivity have been found in non-eating-disordered relatives of probands with BN (Klein & Walsh, 2003; Lilienfeld et al., 2000).

As with AN, body image is a source of psychological distress for those diagnosed with BN, as the behavior is aimed at achieving weight loss that corresponds to an ideal body image. As previously stated, this behavior begins early on in adolescence, usually during or after some form of diet practice, with the individual discovering a specific method that appears to rid the body of unwanted calories. The usual method of choice is manually induced vomiting, and can also include the abuse of laxatives, enemas, and diuretics. Another option may be that of

the use of stimulant medication and thyroid hormone replacement drugs, as these may contribute to weight loss (Klein & Walsh, 2003).

Contrary to those who suffer from AN, bulimics are usually more willing to undergo treatment, with initial treatment being conducted on an outpatient basis. The two most effective treatment approaches to date are that of CBT (Fairburn et al., 1995; Klein & Walsh, 2003) and psychopharmacological treatment with drugs such as antidepressants (Klein & Walsh, 2003; Zhu & Walsh, 2002).

### **Binge Eating Disorder (BED)**

BED has recently been defined as a phenomenon that involves recurrent episodes of overeating such as those found in BN, however with BED, no compensatory behaviors such as purging are present (Grilo et al., 2008; Guerdjikova, O'Melia, Mori, McCoy, & McElroy, 2012; Hrabosky et al., 2007; Keel, Holm-Denoma, & Crosby, 2011; Klein & Walsh, 2003). At present, it is estimated that the lifetime prevalence of BED in the US is 3% and may be on the rise (Guerdjikova et al., 2012; Hudson et al., 2007). Previously established as a research diagnosis in the DSM-IV (American Psychiatric Association, 2000; Hrabosky et al., 2007; Wilfley et al., 2000), with suggestions that further study be conducted (Carrard, Van der Linden, & Golay, 2012; Spitzer et al., 1991), questions were posed as to the distinction between BN non-purging subtype and BED. According to Hudson, Hiripi, Pope, and Kessler (2007), the research diagnosis of BED is more common than AN and BN, and is as chronic as both (Grilo et al., 2008; Guerdjikova et al., 2012; Pope et al., 2006). Presently, sufficient evidence has been found to substantiate clinically significant

differences between syndromes that in the past have been considered partial syndromes of BN (Carrard et al., 2012; Keel et al., 2011; Striegel-Moore et al., 2001). Therefore, BED has now been included in the DSM-5 as its own disorder (American Psychiatric Association, 2013).

Although BED is not necessarily gender specific (Guerdjikova et al., 2012), according to Hudson et al. (2007), men show more symptomatic behavior of BED than women. As with BN, individuals who are diagnosed with BED experience recurring episodes wherein they consume significantly more food in a short timespan than one would normally consume. They are also likely to feel as if they have no control over the situation, and may even engage in this behavior when they are not hungry (Fairburn & Cooper, 1993; Wilfley et al., 2000). They may also try to hide the behavior, as do those diagnosed with BN. Common reasons for engaging in BED are boredom, habit, and lack of willpower (Guerdjikova et al., 2012). BED should not be confused with overeating, as BED is much more severe and is linked to an array of psychological and physiological problems (American Psychiatric Association, 2013).

Similar to that of AN and BN, individuals who present with BED are also diagnosed with specific co-occurring psychiatric disorders (Carrard et al., 2012; Grilo et al., 2008; Hudson et al., 2007; Striegel-Moore et al., 2001) such as mood disorders, specifically depression (Guerdjikova, et al., 2012; Keel et al., 2011) in the form of Major Depressive Disorder (MDD) (Mussell et al., 1996; Specker, de Zwaan, Raymond, & Mitchell, 1994; Telch & Stice, 1998; Wilfley et al., 2000; Yanovski, Nelson, Dubbert, & Spitzer, 1993), along with anxiety (Antony, Johnson, Carr-

Nangle, & Abel, 1994; Guerdjikova et al., 2012; Keel et al., 2011; Wilfley et al., 2000), impulse control disorders (Keel et al., 2011), and substance abuse disorders (Keel et al., 2011; Wilfley et al., 2000). Of these comorbidities, Major Depressive Disorder (MDD) is the most commonly diagnosed (Mussell et al., 1996; Specker et al., 1994; Telch & Stice, 1998; Wilfley et al., 2000; Yanovski et al., 1993). Overall, the severity of binge eating has been positively associated with higher levels of psychiatric comorbidity, specifically significantly higher rates of depression and anxiety (Guerdjikova et al; 2012; Keel et al., 2011). Those diagnosed with binge eating present with more interpersonal problems, psychiatric symptoms and lower self esteem (Antony et al., 1994; Carrard et al., 2012; Mussel, 1996; Striegel-Moore et al., 2001; Telch & Agras, 1994; Wilfley et al., 2000). These issues are found in those with BED regardless of whether or not the individuals present with normal weight or are obese (Keel et al., 2011).

Personality disorders associated with BED are of Borderline Personality Disorder (BPD), Narcissistic Personality Disorder, Avoidant Personality Disorder, and Obsessive-Compulsive Personality Disorder (OCPD) (Specker et al., 1994; Telch & Stice, 1998; Wilfley et al., 2000; Yanovski et al., 1993). As such, BED symptomatology may have higher levels of severity when occurring in conjunction with personality disorders. Perhaps those with personality disorders may be more inclined to have experiences such as affective instability or social isolation that may trigger binge episodes (Wilfley et al., 2000).

Unlike AN and BN, no body-image-related criterion has been established for the BED diagnosis (Hrabosky et al., 2007). Regardless, evidence shows that individuals who present with BED are similar to those with AN and BN in relation to body image disturbance (Keel et al., 2011), shape/weight concerns (Hrabosky et al., 2007; Masheb & Grilo, 2000; Wilfley et al., 2000), and overvaluation (Grilo et al., 2008; Mond, Hay, Rodgers, & Owen, 2007; Wilfley et al., 2000), as well as showing significantly greater shape/weight concerns compared to overweight individuals who do not present with BED (Allison, Grilo, Mahseb, & Stunkard, 2005; Hrabosky et al., 2007). Furthermore, Grilo et al. (2008) and Hrabosky et al. (2007) found that overvaluation was strongly associated with various measures of eating-related psychopathology and psychological functioning, specifically, eating disorder psychopathology, body image dissatisfaction, and poorer psychological status in the form of higher levels of depression and lower self-esteem. Their research supports previous findings that overvaluation is a significant factor in BED (Fairburn & Harrison, 2003; Hrabosky et al., 2007; Wilfley, Wilson, & Agras, 2003), and is similar to those who present with BN (Hrabosky et al., 2007; Masheb & Grilo, 2000; Wilfley et al., 2000) and support the need for consideration of body-image-related criterion as part of an established diagnostic criteria (Grilo et al., 2008). As was found with mood disorders and BED, body image disturbances are found in those with BED regardless of whether or not the individuals are normal weight or are obese (Guerdjikova et al., 2012; Keel et al., 2011).

BED is considered a distinct observable trait seen within families where obesity is a factor (Carrard et al., 2012; Grilo et al., 2008; Guerdjikova et al., 2012; Hudson et al., 2006; Keel et al., 2011; Spitzer et al., 1992, 1993), with those diagnosed with BED having the highest lifetime prevalence of obesity compared to those with other eating disorders (Carrard et al., 2012; Villarejo et al., 2012). Weight problems and an attempt to lose weight via various diets usually precede the development of BED (Guerdjikova et al., 2012). It is important to note that some individuals who present with BED also present with a BMI that is considered in the normal weight range (Carrard et al., 2012; Spitzer et al., 1992, 1993), with suggestions made that further studies be conducted with regard to this particular group (Carrard et al., 2012; Spitzer et al., 1993).

Cognitive interventions have been empirically shown to be superior to other methods for the treatment of BED (Hrabosky et al., 2007; Wilson, Grilo, & Vitousek, 2007). Additionally SSRIs are also recommended (Guerdjikova et al., 2012).

### **Avoidant/Restrictive Food Intake Disorder (ARFID)**

Previously referred to as Feeding Disorder of Infancy or Early Childhood (FDIEC) in the DSM-IV (American Psychiatric Association, 2000), the diagnostic criteria was expanded, in order to include eating disorders that previously fell within the EDNOS category (Attia et al., 2013). This led to the newly adopted category of ARFID, which has been defined as persistent disturbance in eating which can lead to major clinical problems such as weight loss, inadequate growth, nutritional

deficiencies, feeding tube or nutritional supplement dependency, and/or impaired psychosocial functioning (Kenney & Walsh, 2013).

Although little research on ARFID has been published, it is known that ARFID is usually first seen in infancy or childhood and can persist into adulthood. It can also initially present during adulthood as well (Kenney & Walsh, 2013). The course of illness is relatively unknown, however specific situations such as avoidance due to sensory characteristics of food may begin in childhood and persist into adulthood (Mascola, Bryson, & Agras, 2010). There is also the potential for those diagnosed with ARFID to go on to develop other eating disorders, specifically AN, however no prospective studies have been conducted (Kenney & Walsh, 2013). Furthermore, impaired social functioning in both children and adults may be associated with ARFID (Fisher, 2014; Kenney & Walsh, 2013). For adults, the problem may manifest in the workplace in the form of avoiding working lunches. In social situations, whether it be at home or out with friends, they may avoid the situation altogether when food is present. Children may experience problems at school in the way of needing extra time to eat their school lunch, which may lead to problems with schoolwork (Fisher, 2014).

Various psychological disorders may be risk factors for ARFID. These may include anxiety disorders, obsessive-compulsive disorders, attention deficit disorders, and autism spectrum disorders (Timimi, Douglas, & Tsiftopolou, 1997). Gastrointestinal conditions such as gastroesophageal reflux may result in feeding disturbances as well (Kenney & Walsh, 2013).

At present there is minimal knowledge as to what types of treatment are deemed most effective for ARFID, however due to the feature of avoidance that is prominent in the diagnosis, behavioral interventions in the form of exposure therapy will likely play an important role. Furthermore, those who experience comorbid diagnoses such as anxiety or depression that impact feeding will most likely benefit from CBT (Kenney & Walsh, 2013).

### **Summation of Patterns of Disordered Eating**

Regardless of the nature of the eating disorder, studies have identified emergent themes of control, connectedness and conflict, which appear to be at the heart of the development, progression, and recovery from the disorders. Furthermore, issues with body image, mood, anxiety and impulse disorders put individuals, in general, at increased risk of developing an eating disorder (Keel et al., 2011). Which domain an individual is vulnerable to may determine which eating disorder they are likely to develop (Keel et al., 2011). According to Babicz-Zielińska (1996), it has been determined that motives, personality and attitudes, as well as attitudes and beliefs towards food and nutrition are key factors that influence nutritional behavior, and even motives that are considered rational can lead to eating disorders. With all the options that are available to consumers today, in many cases the choices that individuals make as to what they may or may not choose to ingest may not always be in accordance with their nutritional needs. This in turn can result in the development of improper food habits (Babicz-Zielińska, 1996; Shepherd & Dennison, 1996).

According to the Theory of Planned Behavior (Ajzen, 1991), Shepherd and Dennison (1996) postulated that behavior itself is a function of a behavioral intention; in the case of eating behaviors, this encompasses the prediction of one's intention towards one's behavior as it relates to food choice. Of all model components, attitudes and perceived control appear to account for the most variance in relation towards a person's intentions regarding foods that will be consumed (Dennison & Shepherd, 1995). The more health-conscious an individual sees himself or herself to be, the more likely it is that they will intend to choose foods that are considered healthier, thus avoiding foods that are not. This in itself is positive; however, even the most positive of intentions can lead to extremes.

Despite the extensive amount of research that has been conducted, and some success with various treatment options, the etiology and effective treatment of eating disorders requires further research (Patching and Lawler, 2009). Seeing as how risk factors for development of the disorders are vast, the argument has been made that it is important that the unique qualities of the individuals presenting be taken into consideration, while at the same time, commonalities between individuals are examined. Furthermore, due to the uniqueness of individuals, treatment regimens should be tailored to the individuals themselves and personality styles (Thompson-Brenner & Westen, 2005). It is suggested that the medical model of diagnoses and treatment of eating disorders is inadequate since there is evidence that programs that focus on prevention and self-worth may be more effective than those that presently

focus primarily on recovery, body image and dietary requirements (Patching & Lawler, 2009).

In the past 20 years we see the emergence of another type of disordered eating in which individuals acquire an unhealthy obsession with healthful eating (Bratman, 1997), and a pathological obsession towards consuming only biologically-pure food (Babicz-Zielińska, 1996). This has been termed Orthorexia Nervosa (ON).

### **Orthorexia Nervosa**

In 1997 concern regarding what was termed orthorexic behavior was brought to the public's attention in the form of an essay describing this potential new disorder (Bratman, 1997). Bratman, a medical doctor in Colorado who specializes in alternative and preventive medicine, asserted that ON was a fixation on eating proper food, and when taken to extremes could lead to severe malnutrition, and ultimately, death. He specifically coined the term, which when broken down is translated as "ortho", (Bratman & Knight, 2000, p. 9) which refers to the Greek translation meaning straight, correct and true, and a modification of the term "anorexia nervosa" to that of Orthorexia Nervosa (Bratman & Knight, 2000).

It is important to note that Bratman did not base his description of ON on empirical studies. Rather, he used his personal experience from exposure to alternative healing methods and healthy eating approaches. In the 1997 article, he described his experiences as a cook and an organic farmer at a large commune in upstate New York, wherein he found himself surrounded by various eating eccentricities displayed by commune members. In the course of his interactions with

these individuals, it became apparent to him that there were many inconsistencies and contradictions within as well as among their individual belief systems regarding healthy eating. This ultimately caused him to question the motives and reasoning behind the various beliefs, which eventually led to a life-changing event between himself and a Benedictine Monk. At the monk's urging he allowed himself to break his healthy eating restraints and indulge in foods that most health advocates would shake a finger at. From there he described an incident that rings of binge eating that he willingly took part in, and thus, experienced all the typical feelings of guilt and remorse that a binge eater goes through (Yanovski, 2003). As previously stated, binge eaters feel as if they have no control over this situation (Fairburn & Cooper, 1993; Wilfley et al., 2000) and experience high levels of distress, along with depression and anxiety (Guerdjikova et al; 2012; Keel et al., 2011).

As a physician Bratman encountered a situation with a female patient who, while in the course of treatment for asthma, began to eliminate specific foods that were potentially triggering her asthma due to allergic reactions. Over time, she became more and more obsessed with the types of food she was eating, which eventually led to severe maladaptive behavior and nutritional deficiencies. It is from experiences of this nature, and those that he encountered while at the commune that Bratman came to the conclusion that healthy eating, when taken to extremes could represent a new type of eating disorder (Bratman, 1997). Subsequently, Bratman, in collaboration with another colleague, wrote an entire book about this phenomenon in which he elaborated more fully on the etiology and circumstances of this new

disorder (Bratman & Knight, 2000). Written and classified as what might be considered a self-help book, the authors provide the reader with an opportunity to personally assess whether or not they may be suffering from symptoms of ON in the form of a 10-question quiz comprised of dichotomous choices (Yes/No). Donini, Marsili, Graziani, Imbirale, and Cannella (2005) later referred to this as Bratman's ORTO-10. According to Bratman, the more questions that resulted in yes answers, the higher the orthorexic tendency. It is Bratman's contention that ON is highly prevalent in the United States, and as such, should be addressed. As a result, his work has led to more attention being given to studying and understanding its implications in the form of empirical research, and at present it has been placed in the category of eating disorders that need further study in the DSM-5 (American Psychiatric Association, 2013).

Based on the supposition of Bratman and Knight (2000), Donini, et al., (2004) conducted a study at the Institute of Food Sciences at the University of Rome, with the intent to tentatively propose diagnostic criteria for ON, as well as verify its prevalence. At the onset of their study, Donini et al. stated that very little data existed in Italy or other European countries in regard to the prevalence of ON, however Bratman and Knight (2000) alluded to an alarming situation being prevalent within the U. S. population. The differences in the interpretation of the prevalence are what prompted Donini et al. (2004) to go forward with their study. The authors defined ON as a condition in which individuals become obsessed in a "maniacal" (Donini et al., 2004, p. 151) fashion with healthy eating to such an extent that the individual feels

forced to make extreme or strict food choices that are solely based on the supposed health aspects of the food in question. This in turn may lead to nutrition shortages, as well as the interference of personal and social relationships, thus having an overall negative impact on the individual's quality of life. The authors' implication is that these individuals consider certain foods to be impure and harmful to their health, and that they may actually go to extremes such as to starve themselves rather than eat these types of foods. This extreme behavior is not to be confused with that of AN, where individuals starve themselves due to an intense fear of weight gain and cognitive distortions in relation to their body image (McCabe, McFarlane, Polivy, & Olmsted, 2001). On the contrary, ON allegedly arises due to an intense fear of what may be considered impure and unhealthy foods, with the individuals ultimately dedicating their entire existence to the planning, purchase, preparation and consumption of the foods that he or she considers healthy. Donini et al. (2004) describe ON as also being characterized by traits seen in those with Obsessive-Compulsive Disorder (OCD) and Obsessive-Compulsive Personality Disorder (OCPD).

To determine how particular eating habits and personality might be related, Donini et al. (2004) studied 404 participants from around and near the city of Rome, Italy. Participants were asked to report information regarding demographic details, anthropometric data, eating regimens, and how they specifically categorized food production and conservation characteristics. Production and conservation characteristics pertain to whether or not the food is fresh or homemade, has had

preservatives added, has been processed, or has undergone forms of genetic modification. Participants were also asked to complete the Emotional Eating Scale-11 (EES-11, Arnow, Kenardy, & Agras, 2005), as well as Scale 7 (Psychasthenia) of the Minnesota Multiphasic Personality Inventory (MMPI, Hathaway & McKinley, 1940). In Scale 7, specific traits such as excessive doubts, compulsions, obsessions and unreasonable fears are assessed. The EES-11 is a modified version of the Emotional Eating Scale, which allows for the measurement of the participants' sensations in regard to their desire to eat.

Out of the 404 participants, four groups were identified based on ON being diagnosed in the presence of both "health fanatic" eating habits and obsessive-compulsive traits and phobia as per Scale 7: 28 participants (6.9%) showed symptomatic behavior of ON ("health fanatic" (Donini, et al., 2004, p. 154) eating tendencies along with an elevated Scale 7), 64 participants (15.8%) displayed normal eating behavior along with signs of an elevated Scale 7, 69 participants (17.1%) displayed "health fanatic" eating tendencies along with a normal Scale 7, and 243 participants (60.2%) displayed normal eating behaviors along with normal Scale 7. The authors concluded that compared to the findings of Bratman and Knight (2000), ON is not prevalent in epidemic proportions. Overall, the results of the study indicated participants that were deemed orthorexic were slightly older, were less academically educated, and consumed foods that were homemade or organically produced. One particular finding was nothing short of unexpected in that orthorexic-type behavior was significantly more prevalent in men (11.3%) than in women

(3.9%). The authors attributed the gender prevalence to the cultural stereotypes that men are faced with in regard to aesthetic appearances in the Italian media and society overall.

Significant differences were found in the opinions of those with orthorexic tendencies versus that of the other participants on various factors regarding overall food quality. First, those with orthorexic tendencies rarely consider foods labeled as “fresh” to be considered “genuine” (3.8%) compared to other participants (16.3%). Second, those with orthorexic tendencies were more likely to consider products that have been “conserved” (products where food additives such as preservatives have been included) as “dangerous” (50%) compared to other participants (26.7%). Third, those with orthorexic tendencies view foods that are “industrial” (foods that are mass produced and packaged) as being more “artificial” (88.5%) compared to other participants (69.3%). Finally, those with orthorexic tendencies are more likely to consider foods that are “biological” (foods that are organically grown) to be more “healthy” (53.8%) compared to other participants (40.1%) (Donini et al., 2004, p. 154). This was attributed to the orthoretically-inclined participants attaching specific beliefs, values, and feelings to the foods they consume. Ultimately, those with orthorexic tendencies equate their feelings with specific characteristics of food. According to the results of the EES-11, those with orthorexic tendencies more frequently experienced strong or uncontrollable urges to eat compared to the rest of the participants. This corresponded with specific emotional states of guilt (25.9% vs. 13.0%), nervousness (48.2% vs. 35.0%), excitement (22.2% vs. 10.6%), and

happiness (37% vs. 23.5%). There were statistically significant differences on the guilt and nervousness measures, but none for excitement and happiness. The authors contended that this may be due to those with orthorexic tendencies experiencing a generalized state of anxiety that is relieved by the consumption of specific foods versus that of a physiological stimulus or pleasure from food consumption (Donini et al., 2004). The authors attributed the guilt component in those displaying orthorexic behavior as that of obsessive anguishing over the possibility of losing control when faced with food choices that are contrary to their usual patterns. With ON being characterized as a phenomenon that involves eating, behavioral, and obsessive-phobic personality traits, the authors proposed a diagnostic criteria which included “health fanatic” (Donini et al., 2004, p. 152) styles of eating, along with obsessive-compulsive and phobia associated traits.

It is critical to note that the authors point out that there is a dramatic absence of scientific literature on this topic, and that only one other study has been conducted prior to theirs. It was published only in Swedish by Nymah in 2002 (as cited in Donini et al., 2004), and indexed without an abstract. Consequently this made it very difficult to find and utilize it as a source. Furthermore, the authors also determined that additional studies should be conducted with respect to the obsessive-compulsive component that is so evident in this behavior (Donini et al., 2004).

In what appears to be a continuation or a second phase of the 2004 study, Donini et al. (2005) developed and validated a diagnostic questionnaire that they had previously adapted in their 2004 study from Bratman’s ORTO-10 (Bratman &

Knight, 2000). As previously stated, the intent in the 2004 study was to tentatively propose diagnostic criteria for ON, as well as examine its prevalence (Donini et al., 2004). According to the authors, 525 participants were spontaneously enrolled from around and near the city of Rome, Italy, from a variety of occupations. The participants were randomly divided into two samples, 404 who were the initial participants in the 2004 study during which the diagnostic criteria for ON was determined, and 121 who were selected to validate the new questionnaire which originated from the 2004 study. The questionnaire had been constructed using 15 closed multiple-choice items based on a Likert scale of 1 to 4, with 1 referring to always, 2 referring to often, 3 referring to sometimes, and 4 referring to never. Lower scores were indicative of orthorexic behavior. Total scores could range from 15-60, with lower scores most indicative of ON. The authors refer to this questionnaire as the ORTO-15, and retained six questions with some verbal modification that had been on Bratman's ORTO-10 (Bratman & Knight, 2000). This questionnaire allowed the researchers to investigate emotional and cognitive aspects of the participants, with emphasis on cognitive-rational, clinical, and emotional areas.

As previously noted in the 2004 study, four groups from the 404 participant portion of the sample had been identified on the basis of their eating behaviors and obsessive-phobic personality traits: 28 participants (6.9%) showed symptomatic behavior of ON ("health fanatic" eating tendencies accompanied by an elevated Scale 7 MMPI), 64 participants (15.8%) displayed normal eating behaviors, however showed signs of an elevated Scale 7 MMPI, 69 participants (17.1%) displayed "health

fanatic” eating tendencies along with a normal Scale 7 MMPI, and 243 participants (60.2%) displayed normal eating behaviors along with normal Scale 7 MMPI. Using *t* test and ANOVA, significant differences were found on the ORTO-15 scores between the different groups (Orthorexic behavior,  $M = 39.4$ ,  $SD = 4.0$ ; Normal eating behavior and clinically elevated Scale 7 MMPI,  $M = 41.9$ ,  $SD = 4.0$ ; “Health fanatic” eating behavior and normal Scale 7 MMPI,  $M = 39.3$ ,  $SD = 4.0$ ; Normal eating behavior and normal Scale 7 MMPI,  $M = 42.4$ ,  $SD = 4.0$ ;  $F = 11.9$ ). Based on this data, optimal threshold values for predicting ON using the ORTO-15 were identified through an analysis of receiver-operating characteristics (ROC). This allowed for the determination of sensitivity and specificity of the test at various cut-off levels. ROC analysis, commonly used in clinical radiology research, allows the diagnostician to determine the presence or absence of a particular disease or pathophysiological process which is then either labeled “normal” or abnormal”, as well as “positive” or “negative”. Specificity and sensitivity are then determined through analysis as compared to what is considered to be an appropriate reference standard. This in turn gives the diagnostician an accurate picture as to which cases are truly positive versus negative and adjusts for the variation between them when varying interpretation thresholds exist (Eng, 2005), as was the case with the ORTO-15. It was noted that differences between the two normal eating behavior groups on the ORTO-15 was not statistically significant ( $M = 41.9$ ,  $M = 42.4$ ). However, the mean scores for both the orthorexic and “health fanatic” eating behavior groups ( $M = 39.4$ ,  $M = 39.3$  respectively) on the ORTO-15 were strikingly close. This indicated that ON

symptomology is present regardless of whether or not clinically elevated Scale 7 MMPI levels are also present. The combined means of these two groups ( $M = 39.3$ ) were significantly lower than that of the two normal eating behavior groups ( $M = 42.1$ ). Thus, it was determined that three different threshold values should be tested as a function of different group scores. The threshold values tested were  $<35$ ,  $<40$ , and  $<45$ . Orthorexic behavior would be diagnosed below all three cut-offs.

When examining the predictive value in order to differentiate orthorexic (“health fanatic” behavior along with both normal and elevated Scale 7 levels) participants from the others (normal eating behavior along with both normal and elevated Scale 7 levels), it was noted that the higher the threshold value ( $<45$ ), the lower the efficacy (37.4%). When the threshold value decreased ( $<35$ ), the efficacy value increased (86.5%), along with high specificity (94.2%), and high negative predictive value (91.1%). With increased threshold value comes increased sensitivity (55.6% at 40 points and 85.2% at 45 points), with specificity and efficacy decreasing. Therefore, it was determined that the test becomes unreliable at a threshold of  $<45$ , and as such, the ORTO-15 test and threshold values of  $<35$  to  $<40$  were used with the validation sample of 121 participants. The results indicated that substantial validity of the test was confirmed when specifically using the threshold value of  $<40$  (sensitivity 100%, specificity 73.6%, positive predictive value 17.6%, negative predictive value 100%) versus that of  $<35$  (sensitivity 0.0%, specificity 94.3%, positive predictive value 0%, negative predictive value 94.3%). Results of the ROC curve analysis which

was representative of the overall accuracy of the ORTO-15 test in regard to diagnosis of ON was 0.696 (95%).

Despite the overall robust reliability of the instrument, the authors pointed out that the sample was a convenience sample, which limits the generalizability of the results. It was their conclusion that further research should be done using more varied sampling methods. They also determined that although the ORTO-15 shows notable predictive capability where healthy eating behavior is concerned, the ORTO-15 scores related to the obsessive-compulsive element were not significantly related to Scale 7 scores of the MMPI, indicating that separate variables are being assessed. It was their suggestion that new questions be added to the ORTO-15 in order to evaluate obsessive-compulsive behavior. Finally, it was suggested that further research was needed for continued test validation, as the original test was validated in Italian. The present version of the test was translated into English for editorial purposes; the authors do not indicate who completed the translation. It was their suggestion that further validation of this translated version be achieved using an “Anglo-Saxon” (Donini et al., 2005, p. e32) population sample.

Bosì, Çamur, and Güler (2007) referred to the target behaviors of ON as “highly sensitive attitudes in eating behavior” (Bosì et al., 2007, p. 662-663). It was the authors’ supposition that those who exhibit highly sensitive behavior in regard to the foods they consume are at a higher risk of developing ON at a later time. Therefore, they examined the effect of specific factors on eating habits and the risk of developing ON.

Using a cross-sectional convenience sample of 318 resident medical doctors (169 males, and 149 females) in the Faculty of Medicine at Hacettepe University in Turkey, a questionnaire which contained 39 questions designed to identify socio-demographics, daily nutritional intake, physical activities, criteria for food selection, as well as what effect the food choices had on their lifestyle was completed. The first nine questions pertained to the participant's demographics, such as sex, age, marital status, whether or not they had children, residency department, and Body Mass Index (BMI). The age of the participants ranged between 25-29 years of age (71.1%), with a majority reporting a BMI ranging between 18.5-24.99 (65.7%). There were more males (53.1%) than females (46.9%), with a majority of the doctors being single (70.1%) and not having children (90.6%).

The next set of 15 questions assessed their nutritional habits and eating behaviors, how they perceived their bodies, and the amount and type of physical activity they engaged in. The vast majority of the doctors did their own food shopping (79.2%), however only 33.7% reported being concerned as to the importance of their health when shopping. A moderate percentage of the doctors admitted to skipping breakfast (26.7%), and only 20.1% of the male doctors reported that health programs had an effect on their food selection compared to females (38.9%). Female doctors tend to consume more salad and/or fruit for lunch or dinner (51.1%) than do the males (28.9%). This was found to be statistically significant. Statistical significance was also found in regard to the differences between both males and females as it pertained to weight control, and the consumption of low calorie foods, with females scoring

significantly higher. No statistical significance was found in regard to the relationship between gender, weight control, and vitamin/mineral consumption. There was no significant relationship between BMI and weight control.

The final set of 15 questions was obtained from the ORTO-15 as originally constructed by Donini et al. (2005). These questions were translated into Turkish from both Italian and English through a translation process that involved two phases in order to assure accuracy and comprehensibility. Results indicated that there were no significant gender differences, with a mean score of 39.8 (Males = 40.2, Females = 39.4). Secondly, 45.5% of the participants had mean scores below 40, which is the threshold value cutoff for symptomatic behavior of ON based on the diagnostic criteria proposed by Donini et al. (2004, 2005). The relationship of various independent variables (gender, age, BMI, marital status, departments of residency, home location, cohabitants, member of the household that does the shopping, selection criteria for food, the location of meal consumption, concern for weight control, decision to consume low calorie foods and vitamin/mineral supplements, and physical activity level), were compared to scores on the ORTO-15. Scores were analyzed for signs of orthorexic behavior, along with odds ratio values and confidence intervals. Statistical significance was found on ORTO-15 scores as related to weight control (OR = 0.53, CI 95% = 0.32 - 0.89) and food labels (OR = 0.41, CI 95% = 0.18 - 0.92).

The more care shown by the medical doctors as to the nutritional quality of food, the lower the ORTO-15 score based on the threshold cutoff values (Donini et

al., 2005); this was interpreted by the authors as having highly sensitive behavior in regard to healthy nutrition. Lower scores were also found in those who do their own shopping, substitute lunch or dinner with salad and/or fruit, and scrutinize food labels. Overall, statistical significance was found in regard to healthy nutrition. Furthermore, it was noted that the higher the BMI of the resident, the higher the ORTO-15 score, suggesting that the risk of ON decreases with higher BMI's. This may also indicate that those who aren't as concerned with weight, and who do not shop, or cook for themselves, are less likely to report orthorexic type of behavior. No statistical significance was found in this area. However, a relationship was determined between the variable of attention to weight control and orthorexic behavior in regard to those who were currently controlling their weight at the time of the study versus those that were not. Those currently controlling their weight at the time of the study scored lower on the ORTO-15 than those who were not controlling their weight. Lower ORTO-15 scores were also found in those who showed concern for product contents. Differences were also found between those who spend time in natural food departments versus those who do not.

The authors concluded that highly sensitive behavior in relation to healthy and proper nutrition was in fact prevalent among the medical doctors. It was also noted that as the academic education level of the participants increased, so did the level of orthorexic symptomology, however not to a significant extent ( $F = 0.4, p = .71$ ). This is somewhat contradictory to the results in the Donini, et al. (2005) study, wherein it was determined that ON was more prevalent in those less educated. Three limitations

of the study were found. First, obsessive-compulsive tendencies or personality traits were not evaluated. Second, the sample was made up of participants with higher academic education levels than those in the general public. All medical doctors in Turkey are given extensive formal education in “healthy nutrition” (Bosi et al., 2007, p. 666). This may have created a form of bias within the participants when answering certain questions that were posed. Finally, the Turkish version of the ORTO-15 questionnaire had not yet been tested for validity and reliability, thus deeming any results emerging from its use as questionable. Suggestions for future research included the analysis of obsessive-compulsive tendencies and traits, and studies be conducted that are representative of the general public.

The following year Arusoğlu et al. (2008) published a study examining the psychometric properties of the Turkish version of the ORTO-15 (Donini et al., 2005), as well as to determine the relationship between ORTO-15 scores, eating attitudes, symptoms of obsessive-compulsive behavior, and various demographic variables in a more representative sample. The authors referred to ON as that of a “pathological fixation on the consumption of appropriate and healthy food” as previously defined by Matheiu in 2005 (as cited in Arusoğlu et al., 2008, p. 1).

In order to implement the ORTO-15 into the study, the scale was first translated from English to Turkish with assistance of independent evaluations from five professionals that consisted of nutritionists, clinical psychologists, sociologists, translators, and philologists to ensure that the translation was appropriate and effective in terms of Turkish cultural equivalency. The newly translated scale was

then translated back from Turkish to English by three specialists, and was then compared to the original scale, at which point it was determined that the “back translated English version and the original scale were very similar” (Arusoğlu et al., 2008).

After conducting three pilot studies in order to evaluate the items on the scale with intent to confirm clarity and understandability, the final research study was conducted at Hacettepe University using a voluntary sample of 994 participants, 578 females, and 416 males, ranging in age from 19 to 66 years. The mean level of education of the participants was 17.37 years, and all participants were employed as academic and administrative personnel of the university. The participants were asked to complete a Personal Information Form, the ORTO-15, the Maudsley Obsessive-Compulsive Inventory (MOCI) as developed by Hodgson and Rachman in 1977 (as cited in Arusoğlu et al., 2008), and the Eating Attitude Test-40 (EAT-40) as developed by Garner and Garfinkel (1979). The Personal Information Form was composed of demographic information regarding the participant’s height, weight, gender, age, BMI, and highest level of academic education. The participants were also asked to identify if their behavior was impacted when they were exposed to information provided to them from nutritional sources such as food labels. The MOCI is a self-report questionnaire that assesses the nature and intensity of obsessive-compulsive symptoms, with higher scores indicating more severe symptoms. The EAT-40 was designed to measure eating behaviors and attitudes of those suffering from AN, as well as potential problematic eating behaviors that may appear in those

who are not considered anorexic. Those that score high on this measure are considered to have issues with problematic eating behaviors and attitudes. The Turkish versions of both the MOCI and the EAT-40 had been previously tested for validity and reliability by Savasir and Erol in 1988 and 1989 respectively (as cited in Arusoğlu et al., 2008). All instruments that were used in the study were administered in random order to the participants.

In order to ensure the effectiveness of the ORTO-15 scale, the structural properties of the scale were first examined by analyzing the principle components using factor analysis with varimax rotation. The results indicated that a 3-factor solution was appropriate and adequate and accounted for 40.64% of the total variance. These three factors were labeled emotion (Factor 1), behavior (Factor 2), and cognition (Factor 3). Items that loaded on Factor 1 were based on worries and feelings as they pertained to healthy nutrition. Items that loaded on Factor 2 were related to behaviors regarding food selection. Finally, items that loaded on Factor 3 pertained to thought processes in regard to nutrition. Items with a factor loading of  $\geq 0.50$  were then selected for the Turkish version of the scale. The author's reasoning for this decision was due to the fact that no previous studies had been conducted analyzing the factor structure of the original ORTO-15, thus no comparison could be made. Based on previous and current definitions of ON, the authors identified 11 of the 15 questions that they believed would have more statistical power on their own. They referred to this new scale as the ORTO-11 (Arusoğlu et al., 2008). The Cronbach's alpha coefficient of the ORTO-15 was .44, indicating low internal

consistency, while the ORTO-11's internal consistency was .62. Further factor analysis on the 11-item scale identified three factors. When a close examination of the loading of the items was completed, it was determined that most of the items now loaded on Factor 1 (Emotion), although the questions grouped together captured all three factors of emotion, cognition, and behavior. Based on these results, a single-factor structure was deemed as appropriate for the ORTO-11 (Arusoğlu et al., 2008).

In order to determine the relationships between age, education level, and gender on orthorexic tendency, Arusoğlu et al. (2008) conducted a 3 X 3 X 2 ANOVA. A main effect for both education ( $\eta^2 = 0.01$ ) and gender ( $\eta^2 = 0.02$ ) was found. There was no main effect of age, and there were no interaction effects. Results indicated the higher the education level of the participant, the lower their orthorexic tendency. This supports the findings in the Donini et al. (2004) study. Women exhibited significantly more ON symptoms than men ( $M = 26.12$ ,  $SD = 4.33$ ;  $M = 27.56$ ,  $SD = 4.58$  respectively) (Arusoğlu et al., 2008). The results regarding gender are different than those of previous research, where men showed a higher inclination toward orthorexic behavior than did women (Bosi et al., 2007; Donini et al., 2004, 2005). This contradiction may be due to cultural differences between Italy and Turkey, sampling, and the change in the measure. According to Donini et al. (2004) the male population in Italy has been influenced by "body culture", whereas the male population in Turkey may not be affected as such (Arusoğlu et al., 2008).

When examining the scores between the ORTO-11 and the EAT-40, a significant main effect of the eating attitude scores was found on orthorexic behavior

( $\eta^2 = 0.88$ ). Participants who scored high on the EAT-40, respectively scored low on the ORTO-11, thus indicating that those participants who displayed pathological eating attitudes, also displayed orthorexic tendencies. A one-way ANOVA was also conducted to examine effects of obsessive-compulsive symptoms in relation to orthorexic behavior. A significant main effect of the obsessive-compulsive symptoms was found on orthorexic behavior ( $\eta^2 = 0.05$ ). Participants who scored high on the MOCI, respectively scored low on the ORTO-11, thus indicating that those participants who displayed symptoms of obsessive-compulsive behavior, also displayed orthorexic tendencies. This is in contrast to the results in the Donini et al. (2005) study, wherein scores on the ORTO-15 were not significantly related to the Scale 7 MMPI scores that were used to assess the obsessive-compulsive component. The authors contend that the discrepancy is probably due to the difference in the methods used to measure obsessive-compulsive tendencies between the two studies in that the MOCI was used in this study (Arusoglu et al., 2008) compared to Scale 7 MMPI in the Donini et al. (2005) study. ANOVA was also conducted to determine the effect of BMI on orthorexic tendencies, however, no significant main effect was found. This is also in line with the results of the Donini et al. (2004) study. Out of the 994 participants, 63 were being treated on a regular basis with some form of a medical diet. It was determined that these participants scored lower on the ORTO-15 ( $M = 24.9$ ,  $SD = 4.6$ ) as compared to the rest of the participants ( $M = 26.9$ ,  $SD = 4.4$ ). Finally, a stepwise multiple regression analysis was conducted in order to determine how specific demographic variables predicted ORTO-11 scores. Gender, education,

eating attitude, obsessive-compulsive symptoms, and BMI were contributive to 15% of the total variance. However, it was noted that once the second block of variables was introduced, education was no longer considered a predictive variable. Age was not a significant predictor of orthorexic tendencies. This is in contrast to the Donini et al. (2004) study, wherein participants who were older showed higher levels of orthorexic tendencies. Overall, female gender, pathological eating attitude, and increased obsessive-compulsive symptoms significantly predicted orthorexic behavior. Furthermore, only when there is a high BMI combined with pathological eating attitudes and obsessive-compulsive symptoms does BMI play a significant role in orthorexic behavior (Arusoğlu et al., 2008).

The authors contend that ON is on the rise. Evidence indicates that ON is affected by distorted eating attitudes and obsessive-compulsive behavior, and when combined with a high BMI, can be predictive of orthorexic behavior. In discussing the limitations of their study, the authors called attention to the serious lack of research in regard to ON, thus limiting external criteria that is available. Furthermore, the authors emphasized that the ORTO-11 scale was a newly developed scale, based on some aspects of ON that were used to investigate the relationship between ON and theoretically related variables. It was their suggestion that future comprehensive studies be conducted regarding the ORTO-11, specifically to determine if the scale can be used to identify those who present with clinical orthorexic symptoms. Finally, the authors indicated that care and caution should be taken in the generalization of the findings of the ORTO-11 to the general public. Future studies should be conducted

using the ORTO-15 in its original state. It is their opinion that the functionality of the complete scale, as well as the Turkish version of the scale, can only be determined after a sufficient amount of study has been done (Arusoğlu et al., 2008).

Other studies have been conducted to assess the validity of the ORTO-15 as well as other measures, including the ORTO-11 and the ORTO-10. Using a sample of 177 male and female participants taken from the general population along with an epidemiological study in Milan, Italy, Ramaciotti et al. (2011) found a prevalence rate of 57.6% ( $n = 102$ ). This was confirmed using the  $< 40$ -point threshold value (Donini et al., 2005). Aksoydan and Camci (2009) found a 56.4% ( $n = 53$ ) prevalence rate out of a sample of 94 participants, 39 male, 55 female, all of whom were performance artists in the Turkish State Opera and Ballet and the Bilkent University Symphony Orchestra. Once again, data were confirmed using the  $< 40$ -point threshold value (Donini et al., 2005). It was interesting to note that the majority of those who presented with orthorexic symptomology were opera singers ( $n = 36, 81.8\%$ ). As in the Arusoğlu et al. (2008) study, Fidan, Ertekin, Işıkay, and Kirpinar (2010) utilized the ORTO-11 on a sample of 878 medical students, 464 male, 359 female, at Ataturk University in Turkey. The authors found a 36.9% ( $n = 324$ ) prevalence rate using a threshold cutoff of 27. This cutoff was chosen based on a mean ORTO-11 score of 26.8 and a median score of 27. Participants scoring 27 or less were considered symptomatic of ON. With the ORTO-11 score ranging from 0 – 44, the total score was divided equally into 3 groups. This resulted in 17 participants (1.9%) with scores between 0 and 15, 505 participants (57.5%) with scores between 16 and 30, and 185

participants (21.1%) with scores of 31 or higher. There were 324 participants (36.9%) with scores of 27 or lower, with 383 participants (43.6%) scoring higher than 27; thus explaining the median score of 27 used as the threshold cutoff. Using the ORTO-10 as originally created by Bratman (Bratman & Knight, 2000), Kinzi, Hauer, Traweger, and Kiefer (2006) assessed the eating behavior of a sample of 283 female participants who were dieticians in Austria. It was reported that a prevalence rate of 12.8% ( $n = 36$ ) was found. If participants answered yes to four or more questions, they were considered to be in the category of those with orthorexic symptomology. Finally, in a review of previous research conducted, Brytek-Matera (2012) refers to a study conducted by Varga and Máté (2009), wherein it was determined that a 56.9% prevalence rate was found in a sample of university students in Hungary. The actual number of participants was not referred to in the Brytek-Matera (2012) study, only the percentage found. No other specific details were mentioned as well.

Although it is clear that the amount of research on ON is somewhat limited in quantity, ON's presence is undeniable. Therefore, it is important to question, investigate, and evaluate what conditions may be present that can fuel such behavior. By delving into the important area of personality it may possible to uncover patterns that are at the root of this phenomenon, and that set the stage for its development and onset.

### **Personality and Eating Behavior**

Theories as to what personality is and how it affects behavior have been an ongoing area of discussion since the birth of Psychology. Various theoretical models

regarding personality traits have been proposed; for example, Dispositional Trait Theory (Allport, 1937), The 16 Personality Factor System (Cattell, Eber, & Tatsouoka, 1970), The Hierarchical Model of Personality (Eysenck, 1981), The Big Five Factor Model (Goldberg, 1990), and more recently, the HEXACO Model of Personality Structure (Ashton & Lee, 2008). For this study, the focus will be on the Big-Five Factor Model of Personality and its specific domains: Extraversion (E), Agreeableness (A), Conscientiousness (C), Neuroticism (N), and Openness (O) (Costa & McCrae, 1989). The Big-Five scale is hierarchically structured in such a way that each domain is subdivided into six facets (Claes et al., 2006). This model is widely accepted by personality psychologists due its powerful empirical base (Bollen & Wijniewiczowski, 2004), as well as its reliability and strong evidence for construct validity (Brookings & Wilson, 1994). Some regard this model as being representative of a basic structure for what is considered normal personality (Saulsman & Page, 2004). As such it is presently the dominant model used today (Digman, 1990).

Extraversion is defined as consisting of the following traits: active, assertive, energetic, enthusiastic, outgoing, and talkative. Individuals that score high on Extraversion are described as being gregarious, humorous, facially and gesturally expressive, and having a rapid personal tempo. They have also been referred to as warm, positive, and exciting. Agreeableness is defined as consisting of the following traits: appreciative, forgiving, generous, kind, sympathetic and trusting. Individuals that score high on Agreeableness are described as being encouraging, giving, considerate, warm, and compassionate. They have also been referred to as

straightforward, altruistic, compliant, and modest. Conscientiousness is defined as consisting of the following traits: efficient, organized, planful, reliable, responsible, and thorough. Individuals that score high on Conscientiousness are described as being dependable, productive, ethical, and show levels of high aspiration. They have also been referred to as being competent, self-disciplined, and strive for high levels of achievement. Neuroticism is defined as consisting of the following traits: anxious, self-pitying, tense, touchy, unstable, and worrying. Individuals that score high on Neuroticism are described as being thin-skinned, self-defeating, showing concern with adequacy, and displaying an overall anxious attitude regarding life experiences. They have also been referred to as hostile, impulsive, and may lean towards bouts of depression. Openness is defined as consisting of the following traits: artistic, curious, imaginative, insightful, and having wide interests. Individuals that score high on Openness are described as being introspective, aesthetically reactive, engaging in unusual thought processes, and valuing of intellectual matters. They have also been referred to as those who engage in fantasy, and are expressive of their feelings, ideas, and values (McCrae & John, 1992; Tasca et al., 2009).

Each of the five domains provides descriptive data on personality traits, which in turn can aid in the diagnosis and treatment for a plethora of psychological disorders (Bollen & Wojciechowski, 2004). Various measurements have been devised in an attempt to accurately assess the specific traits, such as The Eysneck Personality Inventory (EPI, Eysneck & Eysneck, 1972), The 16 Personality Factor Scale (16 PF, Cattell et al., 1970), a taxonomy to specifically measure the factors using a trait

approach, with some Big Five factors present, The Mini Marker subset of the Big-Five scale (Saucier, 1994), and the Big Five Factor Model (Goldberg, 1990). The version of the Big-Five scale that will be used in this study is the NEO-FFI-3 (McCrae, Costa, & Martin, 2005), a short version of the NEO-PI-3 (McCrae et al., 2005). The NEO-FFI-3 consists of 60 items adapted from the NEO-FFI-R (McCrae & Costa, 2004). The Big-Five scale is hierarchically subdivided into six facets each of which fall under these five domains (Claes et al., 2006). Items are then scored based on a 5-point Likert scale of measurement ranging from *strongly agree*, to *strongly disagree* (Costa & McCrae, 1989).

### **Personality and Disordered Eating**

It has been hypothesized that personality factors and traits such as perfectionism and excessive compliance are significantly related to the pathogenesis and course of disordered eating behavior, with the presence of specific personality traits being regarded as risk factors for the development of eating disorders (Ghaderi & Scott, 2000). Various research approaches such as psychoanalytic, psychodynamic, and phenomenological have been used to study eating disorders (Ghaderi & Scott, 2000). Some researchers have argued that personality dimensions should be addressed when diagnosing those who present with disordered eating behavior in hopes of increasing understanding of its etiology, symptom progression, and when planning treatment (Tasca et al., 2009). According to Bollen and Wojciechowski (2004) and Tasca et al. (2009), very few studies have utilized the Five-Factor Model in this area of research, however it has been suggested that this model can provide

highly relevant information pertaining to the diagnosis of eating disorders (Ghaderi & Scott, 2000). Tasca et al. (2009) argue that a flexible diagnostic approach that uses both eating disorder symptoms and an evaluation of personality dimensions may result in a reduction of individuals who are currently difficult to place in a specific eating disorder category, i.e., those who at the time of the study were currently diagnosed with Eating Disorders Not Otherwise Specified (EDNOS) based on DSM-IV-TR criteria (American Psychiatric Association, 2000). Under the new DSM-5 criteria, diagnoses such as these will be found listed as Feeding or Eating Disorders Not Elsewhere Classified (FEDNEC, American Psychiatric Association, 2013).

In a study conducted by Brookings and Wilson (1994), the NEO Personality Inventory (NEO-PI, Costa & McCrae, 1985) was used in conjunction with other measures in order to assess contributions of personality and family environment to eating attitudes and behaviors. Using a convenience sample of 137 female college undergraduates ranging between the ages of 17 to 21 years, participants were asked to complete the Eating Disorder Inventory (EDI, Garner & Olmsted, 1984), the Eating Attitudes Test (EAT-26, Garner, Olmstead, Bohr, & Garfinkel, 1982), the NEO-PI (Costa & McCrae, 1985), and the Family Environment Scale (FES, Moos & Moos, 1986).

Data pertaining to the EDI subscales and EAT-26 were correlated with that of the NEO-PI facet scales and FES subscales. There were multiple significant relationships found between Neuroticism (N), Extraversion (E), EDI subscales, and

the scores on the EAT-26. Few significant correlations were found between Openness to Experience (O) and the eating disorder measures (Brookings & Wilson, 1994).

A series of multiple regression analyses were then conducted to examine independent and joint contributions of personality and family-environment variables as they related to eating disorder measures. The five domains of the NEO-PI were all found to make significant and unique contributions in predicting scores on the eating disorder measures (Brookings & Wilson, 1994).

The authors concluded that personality factors are predictors for self-reported eating attitudes and behaviors, with N being a significant predictor in all areas of the study. Scores on E accounted for a significant part of the variance regarding body image. Therefore, personality variables may aid in the explanation as to why certain factors and behaviors, such as dieting, low self-esteem, and concern for body shape may contribute to eating disorders in some individuals but not in others. It was also noted that due to the study being cross-sectional, it was impossible to draw conclusions regarding etiologic significance of personality and family environment (Brookings & Wilson, 1994).

In an attempt to assess the Big-Five personality dimensions in relation to eating disorders, Ghaderi and Scott (2000) used a short Big-Five questionnaire known as the Mini Marker subset (Saucier, 1994). The scale consists of 40 adjective markers, such as Cold, Organized, Energetic, Kind, Moody, and Intellectual. Answers were scored using a modified version of the original nine-point scale; in this study a five-point scale ranging from *Not at all* to *Extremely* was used. The purpose of the study

was to determine if personality differences existed between individuals with no history of eating disorders versus that of individuals with a lifetime history (Ghaderi & Scott, 2000).

Recruiting a random sample of 2000 women between the ages of 18 and 30 as part of a previous prospective study of eating disorders in Sweden in 1997, participants completed a set of packets that included the Survey for Eating Disorders (SED, Gøtestam & Agras, 1995), which is comprised of 46 diagnostic questions and six demographic questions. This questionnaire was designed to gather information concerning various dimensions of eating disorders in accordance to corresponding criteria in the DSM-IV (American Psychiatric Association, 2000). The Mini-Marker scale questionnaire (Saucier, 1994) was also included. Of the 2000 recruited, 1,157 completed and returned the questionnaires. Based on the information received, participants were then placed into one of two groups, those with a lifetime history of eating disorders (EDL,  $n = 84$ ), and those with no history (Non-ED,  $n = 1014$ ). A follow-up study was done using only the SED and the same participants in 1999 (Ghaderi & Scott, 2000).

Data regarding group differences relative to continuous variables were assessed using multivariate analysis of variance (MANOVA), followed by univariate ANOVAs. Significant differences were found with regard to the Big-Five dimensions of personality between participants with a lifetime history of eating disorders (EDL,  $n = 84$ ) and those with no history (Non-ED,  $n = 1,014$ ). The EDL group showed significantly lower levels of Agreeableness (A) ( $M = 3.92$  vs.  $M = 4.08$ ),

Conscientiousness (C) ( $M = 3.47$  vs.  $M = 3.65$ ) and Emotional Stability ( $M = 3.01$  vs.  $M = 3.43$ ) along with higher levels of Openness (O) ( $M = 3.40$  vs.  $M = 3.21$ ) compared to the non-ED group.

Of the 1,157 participants, 856 completed the follow-up questionnaire. Based on the information received, thirty-three of these participants were then categorized as participants with a first-time incidence of eating disorders ( $n = 33$ ) (Ghaderi & Scott, 2000). When the first-time incidence group was compared with controls (those who never reported symptoms of eating disorders,  $n = 636$ ), significant differences were found concerning Emotional Stability, A, and O, with the incidence group reporting lower A and Emotional Stability, and higher O compared to the control group.

The authors concluded that specific personality traits might be considered as potential risk factors for developing eating disorders, although concern was expressed as to uncertainty regarding reliability and validity of the questionnaires used due to self-report methods. It was also noted, however, that the study was prospective in nature, thus allowing the assessment of personality traits in the participants prior to developing eating disorders in the incidence group compared to those who never reported eating disorder symptoms. It was identified that another follow-up study would be conducted with intent to replicate such results. To date no such follow-up has been completed.

In what was the first known examination of the relationship between the five-factor model and AN and its subtypes (AN-R and AN-BP), Bollen and Wojciecowski (2004) compared 100 eating disorder patients to that of a historical control group

consisting of 1,390 healthy females as provided by the Dutch version manual of the NEO-Five Factor Inventory (NEO-FFI, Hoekstra, Ormel, & de Fruyt, 1996). The NEO-FFI is the shortened version of the NEO-Personality Inventory-Revised (NEO-PI-R, Costa & McCrae, 1992), and measures each of the five factors based on a set of 12 questions per factor using a 5-point scale from “strongly disagree” to “strongly agree”. Raw scores may vary from 12 to 60. Eating disorder participants were categorized as either AN-R or AN-BP based on DSM-IV diagnostic criteria, with 71 identifying as AN-R and 29 as AN-BP. The mean age of the AN-R group was 23.0 years (range of 15 to 45.1 years), and the mean age of the AN-BP group was 23.7 years (range of 15.9 – 43.9 years). All eating disorder participants completed the NEO-FFI (Hoekstra et al., 1996).

Data were analyzed and combined using *t*-tests and the Mann-Whitney test. Results indicated that individuals with AN regardless of the type scored significantly higher on N and O, and significantly lower on E as compared to controls. However, those with restrictive type scored significantly higher on A as compared to controls, with no significant differences found between those two groups on C. Individuals with binge-purge type scored significantly lower on A and C as compared to controls (Bollen & Wojciechowski, 2004).

The authors noted that previous studies have confirmed higher C scores in AN-R patients compared to AN-BP (e.g., Da Costa & Halmi, 1992; Vitousek & Manke, 1994) such as that found in this study (Bollen & Wojciechowski, 2004), as well as high N scores regardless of the AN subtype as previously determined (e.g.,

Heaven et al., 2001; Podar et al., 1999; Tylka & Subich, 1999). The authors emphasized that N is considered a “relatively stable personality characteristic, a trait, rather than a state” (Bollen & Wojciechowski, 2004, p. 120), suggesting that those who present with AN have higher levels of disordered eating behaviors and cognitions, as well as higher levels of psychological distress and emotional instability that lasts over time, thereby warranting specific attention as related to treatment facilitation (Bollen & Wojciechowski, 2004).

A few limitations of the study were noted. First, the AN sample came strictly from a group of patients admitted to an eating disorder unit of a hospital. This creates potential selection bias in that only a small portion of individuals with AN actually seek treatment (Hoek, 1993). Second, the diagnosis of AN along with its subtypes is considered relatively unstable over time. Many individuals with AN-R eventually evolve into AN-BP, and there is ample evidence as to the evolution from AN to BN as well (Bulik, Sullivan, Fear, & Pickering, 1997; Kasset, Gwirtsman, Kaye, Brandt, & Jimerson, 1988). It has also been suggested that AN-R is only a phase of the AN course, and not a stable, distinct subset of AN (Eddy et al., 2002). Finally, the authors noted that this study was retrospective in nature in that personality factors were examined in a group of patients who presented with fully developed AN. Suggestions were made that future studies of a large-scale prospective nature be conducted using pre-adolescent girls in order to determine the possibility of causality between personality factors and AN.

Tasca et al. (2009) examined personality dimensions of women with eating disorders compared to those without, as well as what personality factors would be related to eating disorder attitudes, behaviors, and affective distress in those with eating disorders. A sample of 360 participants was selected for the study based on eating disorder diagnosis criteria and specific recruitment procedure. Of the 360 participants, a clinical sample was identified consisting of 244 women with eating disorders as determined by semi-structured clinical interviews and assessment of diagnostic measures. All 244 participants completed the NEO-FFI (Costa & McCrae, 1992), the Personality Assessment Inventory (PAI, Morey, 1991), the Eating Disorder Examination-Questionnaire (EDEQ, Fairburn & Beglin, 1994), and the Eating Disorder Diagnostic Scale (EDDS, Stice, Telch, & Risvi, 2000). The clinical sample was then categorized based on a diagnosis determined by scores on the EDDS, with 45 presenting with AN-R, 50 with AN-B, and 149 with BN. Of the 360 participants, a non-clinical sample was identified consisting of 116 women without eating disorders recruited from an introductory psychology class, a nursing graduate class, and through community print advertising. All 116 participants completed the NEO-FFI (Costa & McCrae, 1992), the PAI (Morey, 1991), and the EDEQ (Fairburn & Beglin, 1994), with results of the EDEQ and PAI determining which individuals presented with no eating disorder symptomology (Tasca et al., 2009).

In order to determine whether or not there were differences between the clinical sample and the non-clinical sample as related to the NEO-FFI, MANOVA and *post hoc* Tukey tests were conducted. Overall, significant results were found (*F*

(10, 492) = 4.21,  $p < .001$ ), although a small effect size was also found,  $\eta^2 = .08$ . Compared to the non-clinical sample, participants in the clinical sample showed higher levels of N and lower levels of E. Participants with AN-R and those in the non-clinical sample showed higher levels of A as compared to participants with AN-B and BN. Furthermore, participants with AN-R and those in the non-clinical sample scored higher on C versus that of those with BN. Finally, participants with AN-R scored higher on C than those with AN-B (Tasca et al., 2009).

The authors concluded that this study supports the findings from other studies, specifically Westen and Harnden-Fisher (2001), that personality dimensions are an important factor in the explanation of meaningful variances of several areas of clinical importance in regard to the assessment and treatment of eating disorders. Emphasis was placed on personality dimensions of high N (emotional dysregulation) and A (need to please/passivity), along with low O (constricted range of interests) as contributing to a moderate amount of variance in eating disorder attitudes and behaviors. It is possible that characteristics such as needing to please, being passive, and being limited/constricted in a range of interests may actually contribute to how eating disorder attitudes and behaviors are expressed, especially when they are coupled with emotional dysregulation. Furthermore, high N scores contributed to a large amount of variance in affective distress, with low E (introversion) contributing a modest but significant amount. This supports the general idea that individuals who present with eating disorder symptomology also experience difficulties with emotion regulation, along with interpersonal problems. As such, the authors emphasized the

need for treatment strategies that address personality functioning as well as symptomology. This would involve concurrent treatment that focuses on affect regulation, self-reflection, the reduction of impulsiveness, as well as the targeting of maladaptive interpersonal functioning and the promotion of motivation for change. It was suggested that new diagnostic approaches to eating disorders involve flexible combinations of categorical and dimensional evaluations. This may lead to the reduction of those who do not qualify for a specific eating disorder category, i.e., those who fall under EDNOS as per DSM-IV criteria (American Psychiatric Association, 2000). This type of approach was supported by the findings of Wonderlich et al. (2005).

Limitations of the study included that of a cross-sectional design being used along with self-report measures, thus limiting the ability to examine causality. There is speculation as to whether or not the NEO-FFI is accurate or valid due to implicit or non-conscious aspects of personality functioning (Westen, 1995). Second, there is much debate as to whether or not the personality traits examined in this study are stable; these traits may be exaggerated by eating disorder symptoms and severity (Wonderlich & Mitchell, 2001). However, others argue that the personality traits are the underlying issue through which the eating disorder symptoms are expressed (Westen & Harnden-Fischer, 2001). Findings of Bloks, Hoek, Callewaert, and van Furth (2004) emphasize both sides of this debate, identifying that with intensive ED treatment, significant positive changes are found in personality traits and ED symptoms. Therefore, they concluded that both the personality traits and the eating

disorder symptoms vary over time, with the traits being exaggerated during acute phases of the eating disorder. Finally, the sample was limited to participants that consisted of Caucasian, middle-income women, thus limiting the generalizability of the findings to the overall population. The authors suggested that future studies include more ethnically and gender diverse samples (Tasca et al., 2009).

The aforementioned studies shed light on how personality is related to eating behavior of the disordered type, and as such, set a foundation for what may be expected with ON and its relationship to personality. It was established that N plays a significant role in regard to disordered eating, specifically as it relates to AN (Bollen & Wojciechowski, 2004; Brookings & Wilson, 1994; Ghaderi & Scott, 2000; Tasca et al., 2009). Furthermore, C was also found to be a factor, as well, specifically in relation to the subtype of AN-R (Tasca et al., 2009). This is relevant to the present study in that it is expected that both N and C will also play a significant role in ON symptomology. With ON also considered a restrictive type of eating behavior, this allows a comparison between the two disorders, and offers an opportunity to consider similarities in personality traits. This may lead to the potential conclusion that there is an overlap between ON and AN-R behavior, as some similarities have been noted. Obsessive-compulsive behavior has been linked to some extent in both AN and ON symptomology, as well as strict behavior regarding food regimentation. Furthermore, such regimentation can lead to maladaptive patterns and social isolation in both cases. Although the underlying issue with AN-R is the quantity of food restricted, with ON,

the emphasis is on the quality of the food. Regardless, both disorders interfere with the quality of one's life (Bratman & Knight, 2000; Klein & Walsh, 2003).

### **Personality and Orthorexia Nervosa**

**Obsessive-compulsive personality disorder.** As identified in previous studies, obsessive-compulsive behavior has been established to some extent when determining factors of personality that may be associated with orthorexic behavior (Arusoğlu et al., 2008; Bosi et al., 2007; Donini et al., 2004, Donini et al., 2005). Although OCPD will not be specifically examined in the present study, it is helpful to briefly note any connections, if any, between OCPD and personality. Big Five personality traits such as N and C have been associated with obsessive-compulsive behavior, both of which will be examined in the present study. Both Deary, Peter, Austin, and Gibson (1998), and Bienvenu et al. (2004) found high levels of N associated with obsessive-compulsive behavior, but not C. On the contrary, Samuel and Widiger (2011) found high levels of C associated with obsessive-compulsive behavior. Therefore, personality and OCPD appear to be connected to some extent. This presents new questions as to what other role, if any that personality may play in ON.

**Perfectionism.** In a review regarding the psychological factors that may be present in regard to one's food choices, Babicz-Zielińska (1996) referred to ON as a pathological obsession with biologically pure foods, which in turn can result in substantial dietary restrictions. According to the author, individuals who display orthorexic behavior go so far as to exclude any foods that they may consider to be

impure under the assumption that the food itself may contain herbicides, pesticides, artificial ingredients or preservatives, or may be processed in such a way that the nutritional value of the food has been compromised. Ultimately, individuals with orthorexic tendencies isolate themselves from social settings in an attempt to maintain complete control over their dietary intake, all the while creating affective dissatisfaction due to the overwhelming obsession to be in control of their food environment. It is Babicz- Zielińska's assertion, however, that healthy foods have been associated with positive emotions, such as self-confidence and happiness. This may explain the individual's attempt to control their dietary situation; having a sense of control in the form of eating only healthy foods gives them a higher feeling of self-confidence (Babicz- Zielińska, 1996).

**Personality traits.** To date, no studies have been conducted in regard to the role the Five-Factor Model of Personality may play in ON. To the best of this author's knowledge, this will be the first study to address this issue. The present study will specifically look at the personality domains of N and C, along with an exploratory view of O, E and A and how these domains play a role in ON.

### **The Present Study**

The purpose of this study is designed to investigate the relationship of the Big Five Factor Model personality characteristics of Neuroticism and Conscientiousness, along with exploratory analysis of Openness to Experience, Extraversion, and Agreeableness to scores on the ORTO-15, a scale developed to indicate disordered eating. To date, no research studies have been conducted that specifically examine

these personality traits in connection with ON; only traits representative of obsessive-compulsive personality disorder have been studied and linked to ON.

It is hypothesized that there will be a significant negative correlation between Neuroticism scores on the NEO-FFI-3 (McCrae et al., 2005) and scores on the ORTO-15 (Donini et al., 2005). Thus, higher levels of Neuroticism will significantly be related to disordered behavior of the orthorexic type as indicated by lower scores on the ORTO-15. Individuals with high N have been described as being anxious and worrisome, as well as showing concern with adequacy (McCrae & John, 1992). As previously noted, those presenting with ON are overly concerned with the quality of their food (Arusoğlu et al., 2008; Bosi et al., 2007; Bratman, 1997; Bratman & Knight, 2000; Donini et al., 2004, 2005), and as such may worry to excess about details in regard to ingredients, production quality, and preparation techniques; therefore, traits of this nature are expected to be found in those who present with ON symptomology.

It is hypothesized that there will be a significant negative correlation between Conscientiousness scores on the NEO-FFI-3 (McCrae et al., 2005) and scores on the ORTO-15 (Donini et al., 2005). Thus, higher levels of Conscientiousness will significantly be related to disordered behavior of the orthorexic type as indicated by lower scores on the ORTO-15. Individuals with high C have been described as being organized, planful, and thorough, as well as self-disciplined (McCrae & John, 1992). As previously stated, the quality of one's food is of the utmost importance to those presenting with ON (Arusoğlu et al., 2008; Bosi et al., 2007; Bratman, 1997; Bratman

& Knight, 2000; Donini et al., 2004, 2005). As such, these individuals are likely to go to great lengths to plan their days and eating times around the acquisition and preparation of meals, thus requiring a high level of organization and self-discipline; therefore, traits of this nature are expected to be found in those who present with ON symptomology.

Due to the limited amount of research available regarding personality and ON, exploratory analysis will be completed for the domains of O, E, and A. Upon analysis completion, determinations will be made as to whether or not significant findings were found between scores on the NEO-FFI-3 (McCrae et al., 2005) as pertaining to these three domains and scores on the ORTO-15 (Donini et al., 2005). Exploratory analysis will also be conducted in regard to age and scores on the ORTO-15 (Donini et al., 2005).

CHAPTER II  
METHODOLGY

**Participants**

A sample of 441 participants were recruited through Amazon's Mechanical Turk (AMT) ( $n = 301$ , 75.6%) and SONA ( $n = 97$ , 24.4%), the California State University, Stanislaus online research program for students. AMT is an online labor market where researchers can post studies to conduct behavioral research (Mason & Suri, 2011). The minimum age of the participants was 18. Participants from AMT were compensated through the website's built-in payment mechanism at a rate of \$.25 per participant. Students who participated through SONA received extra credit for a specified course, depending on the instructor. All participants were from the U.S. Data was collected during the months of April and May of 2014.

**Measures and Materials**

**Consent Form**

Each participant was provided a consent form in order to participate in the study. This form was in accordance with all APA guidelines in regard to human subjects (American Psychiatric Association, 2013), along with the requirements of the Department of Psychology Investigational Review Board at California State University, Stanislaus. The consent form provided information to the participant regarding the right to withdraw, contact information, confidentiality, and potential risks and benefits of the study to the participant. All participants were given the

option to obtain a printable copy of the consent form for their records (See Appendix A).

### **Demographic Questionnaire**

The Demographic Questionnaire consisted of questions that determine specific personal details about the participants. These items included age, gender, geographical location, ethnicity, sexual orientation, education level, socioeconomic status, history of eating disorders and food allergies, and eating behavior. This form was designed for this study by the author under the advisement of her thesis chair (see Appendix B).

### **ORTO-15 Eating Behavior Scale**

The ORTO-15 (Donini et al., 2005) comprises 15 items rated on a 4-point Likert scale (1 = always, 2 = often, 3 = sometimes, and 4 = never). Each question is designed to measure levels of eating behavior with emphasis on an individual's worries and feelings regarding healthy nutrition, behaviors that are related to the selection of food, and factors that involve cognitions regarding nutrition. As such, the measure itself is broken down into three domains based on factorial analysis: emotional (Factor 1), clinical/behavioral (Factor 2), and cognitive-rational (Factor 3) (Arusoğlu et al., 2008; Donini et al. 2005), which, as previously stated, allowed the researchers to investigate emotional and cognitive aspects of the participants. Items that loaded on Factor 1 were based on worries and feelings as they pertained to healthy nutrition. Items that loaded on Factor 2 were related to behaviors regarding food selection. Finally, items that loaded on Factor 3 pertained to thought processes

in regard to nutrition (Arusoğlu et al., 2008). The lower the total score on the measure, the higher the tendency for orthorexic behavior, with scores ranging anywhere from 15 to 60 (Donini et al., 2005). Questions receiving more “always” and “often” responses are indicative of orthorexic tendencies. Item #'s 1, 3, 5, 8, 9, and 13 were reverse coded. Any score below 40 points indicates some level of ON (Donini et al.). Substantial validity of the test was confirmed when specifically using the threshold value of <40 (sensitivity 100%, specificity 73.6%, positive predictive value 17.6%, negative predictive value 100%) versus that of <35 (sensitivity 0.0%, specificity 94.3%, positive predictive value 0%, negative predictive value 94.3%) (Donini et al.). (see Appendix C).

### **NEO Five-Factor Inventory-3 (NEO-FFI-3)**

The NEO-FFI-3 is designed to provide a brief and comprehensive measure of the five major dimensions of the Five Factor Model of Personality and its domains, specifically Extraversion (E), Agreeableness (A), Conscientiousness (C), Neuroticism (N), and Openness to Experience (O) (McCrae et al., 2005). For this thesis, the focus was on N and C, with exploratory analysis on O, E and A. The measure contains 60 items, broken down into five 12-item scales. Each item is measured based on a 5-point Likert scale of measurement, ranging from strongly agree to strongly disagree. After scores are summed for each domain, the raw data is then converted into *T* scores with a mean of 50 (*SD* =10). Higher *T* scores indicate higher levels of that particular domain, with scores ranging from 66 to  $\geq 75$  indicating very high, 56 to 65 indicating high, 45 to 55 indicating average, 35 to 44 indicating low, and  $\leq 25$  to 34

indicating very low. The N scale assesses on one end the level of negative affect and irrationality an individual may display, whereas lower scores represent more emotional stability. The E scale assesses on one end a higher level of sociality an individual may display, whereas lower scores represent introversion and a lesser social disposition. The O scale assesses on one end how unconventional and liberal in behavior an individual might be, whereas lower scores represent more conventional and conservative tendencies in behavior. The A scale assesses on one end higher levels of fundamentally altruistic behavior, whereas lower scores represent behavior that is considered disagreeable or antagonistic. The C scale assesses on one end how purposeful and determined an individual may be, whereas lower scores represent more lackadaisical behavior (Costa & McCrae, 1992) (see Appendix D).

Internal consistency of the NEO-FFI-3 is comparable to the NEO-FFI, ranging from 0.68 to 0.90 for the five scales (Costa & McCrae, 1992; McCrae & Costa, 2004, 2007). Retest reliability has shown to be high, ranging from 0.86 to 0.86 (McCrae & Costa, 2004, 2007; Robins, Fraley, Roberts, & Trzesniewski, 2001), indicating clear generalizability across genders and strong construct validity (McCrae & Costa, 2007) Furthermore, strong construct validity related to various contexts is also in evidence (McCrae & Costa, 2004, 2007; Pytlik Zillig, Hemenover, & Dienstbier, 2002).

### **Debriefing Statement**

At the end of the study all participants received a debriefing form describing the purpose and nature of the study and where to get further information (see Appendix E).

### **Procedure**

Participants were recruited through AMT and SONA. Those who were interested were able to access further information about the study, the Consent Form, and questionnaires through Qualtrics. Once a participant agreed to participate, he or she was instructed on how to complete all portions of each questionnaire, beginning with the Consent Form.

Upon completion of the Consent Form, the participants then received access to the questionnaires in the following order: Demographics questionnaire, the ORTO-15 questionnaire, the NEO-FFI-3 questionnaire, and the Debriefing Form. The questionnaires were presented to the participants in the order as listed.

### **Data Analysis**

Data were analyzed using the Statistical Package for the Social Sciences (IBM Statistics 22, 2013). Correlational analysis was performed using Pearson Product-Moment correlation coefficient ( $r$ ) to identify if there is a relationship between ON and the personality traits of Neuroticism and Conscientiousness, as well as an exploratory analysis on Openness to Experience, Agreeableness, and Extraversion. Furthermore, simultaneous multiple regression analysis was performed in order to determine if the traits of Neuroticism and Conscientiousness predicted orthorexic behavior. Additional simultaneous multiple regression analysis was performed in the spirit of an exploratory nature to determine if age predicted orthorexic behavior.

## CHAPTER III

### RESULTS

#### **Demographics**

Of the 441 participants who began the questionnaires for the study, 16 questionnaires were discarded due to incomplete data. Of the remaining 425 participants, 75.6% ( $n = 301$ ) were recruited from Amazon MTURK, with the remaining 24.4% ( $n = 97$ ) from CSU Stanislaus. There were 143 identifying themselves as male, 280 identifying themselves as female, and 2 identifying themselves as “other”. The mean age of the participants was 32.32 years,  $SD = 12.69$ , with ages ranging from 18 to 73 years. The most common education level reported by the participants was that of some college (30.9%), closely followed by a four-year degree (29.0%). The average household income of the participants was between \$25,000 and \$50,000 (35.8%). The most common relationship status reported was single (43.6%), followed by married (33.3%). The majority of the participants reported being Caucasian (60.3%) and heterosexual (92.4%). The majority of participants were from California (32.9%), followed by Texas (5.2%), New York (4.8%), and Alaska (4.3%), with a total of 43 states represented in the U.S.

Diagnosed eating disorders were reported by 5.4% of the sample ( $n = 23$ ), the majority being female ( $n = 20$ ). Of these 23 participants, 82.6% ( $n = 19$ ) reported their diagnosis having been made by a qualified professional (e.g. a medical doctor, psychologist, or psychiatrist), with 43.5% ( $n = 10$ ) reporting that they had received

their diagnosis by a medical doctor. Interestingly, five participants said they had been diagnosed with ARFID, yet this diagnostic category was only included in the DSM-5 (American Psychiatric Association, 2013) as of May 2013. Information regarding eating behaviors is shown in Table 1. Participants reported that 11.6% ( $n = 49$ ) of their family members had previously been diagnosed with an eating disorder. Food allergies were reported in 18.7% ( $n = 79$ ) of the sample, 74.6% ( $n = 53$ ) of which reported their diagnosis having been made by a medical doctor. Eleven types of foods were listed for allergy, with the most common being nuts, seeds, and legumes, seafood and shellfish, milk and dairy products, and fruits and berries. A specific dietary plan was followed by 28% ( $n = 118$ ) of the sample, with 40.7% ( $n = 48$ ) of this group reporting that they were vegetarians. Information regarding eating habits is shown in Table 2. The age that dietary plans began ranged from birth to 70 years of age. Of those who followed a specific dietary plan ( $n = 118$ ), many had been following it since birth while the next most common times to institute a specific dietary plan was between 21 and 40 years of age (13.7%,  $n = 59$ ). The majority of “other” specific dietary plans followed consisted of low carb diets, followed by gluten-free diets, and “just eating healthier”. Specific dietary plans had also been followed in the past by 38.2% ( $n = 161$ ) of the participants.

Table 1

*Participant Eating Behavior Diagnoses as a Percentage of the Sample*

Eating Behavior	Diagnosis Information	<i>n</i>	%
Diagnosed with ED ( <i>N</i> = 423)	Yes	23	5.4
	No	396	93.6
	Would Rather Not Say	4	0.9
ED Diagnosis ( <i>n</i> = 23)	Anorexia Nervosa	6	26.1
	Bulimia Nervosa	5	21.7
	Binge Eating Disorder	6	26.1
	Avoidant Restrictive Feeding		
	Intake Disorder	5	21.7
	Other <sup>a</sup>	1	4.3
	MD	10	43.5
ED Diagnosis Made By	Holistic/Alt. Practitioner	1	4.3
	Psychologist	3	13.0
	Psychiatrist	6	26.1
	Nutritionist/RD	1	4.3
	Other <sup>b</sup>	2	8.7
	Yes	49	11.6
	No	365	86.1
Diagnosis of ED in Family ( <i>N</i> = 424)	Would Rather Not Say	10	2.4
	Anorexia Nervosa	14	28.6
	Bulimia Nervosa	19	38.8
Family ED Diagnosis ( <i>n</i> = 49)	Binge Eating Disorder	13	26.5
	Avoidant Restrictive Feeding		
	Intake Disorder	2	4.1
	Other <sup>c</sup>	1	2.0
	Diagnosed with Food Allergies ( <i>N</i> = 422)	Yes	79
	No	343	81.3
Food Allergy Diagnosis Made By MD ( <i>n</i> = 71)	Yes	53	74.6
	No	18	25.4

*Note.* Sample sizes vary due to missing unanswered data. Smaller sample sizes are indicative of those who responded in an affirmative fashion to previous question.

<sup>a</sup>Other ED diagnoses were reported as ED-NOS. <sup>b</sup> Other individuals who made ED diagnosis were MD/Psychiatrist combined and self. <sup>c</sup>Other family ED diagnosis were reported as Morbid Obesity.

Table 2

*Participant Eating Behavior Habits as a Percentage of the Sample*

Eating Behavior Habit	Category	<i>n</i>	%
Following Specific Diet Plan ( <i>N</i> = 421)	Yes	118	28.0
	No	303	72.0
Specific Diet Plan ( <i>N</i> = 118)	Vegetarian	48	40.7
	Raw Food Theory	7	5.9
	Macrobiotics	3	2.5
	Paleo	16	13.6
	Other	44	37.3
	Vegan	6	12.8
Types of Vegetarians ( <i>n</i> = 47)	Lacto	3	6.4
	Lacto-Ovo	12	25.5
	Partial	26	55.3

*Note.* Smaller sample sizes are indicative of those who responded in an affirmative fashion to previous question.

### ORTO-15 Eating Behavior Scale

The mean ORTO-15 score was 39.5, *SD* = 5.06 (*N* = 398), with scores ranging from 24 to 56. A distribution of scores can be found in Figure 1. Cronbach's alpha analysis indicated an internal consistency of .62. This is just under the  $\geq .70$  range, indicating that there may be questions on the measure that could be considered problematic. In fact, item total statistics indicated that if questions 1, 13, or 15 were omitted, Cronbach's alpha would increase to .66, .66, and .63 respectively, thus increasing the internal consistency of the measure, although not to a large extent.

Of the 398 participants, 198 (49.7% of the sample: 56 male, 141 female, and 1 other) reported scores below 40, which, based on diagnostic criteria as proposed by Donini et al. (2004, 2005), would be considered clinically indicative of orthorexic symptomology. The remaining 200 participants (50.3% of the sample, 75 male, 124 female, and 1 other) reported scores  $\geq 40$ , which, according to Donini et al. (2005) are not considered clinically indicative of orthorexic symptomology.

The majority of participants presenting with orthorexic symptomology were between the ages of 21-30 ( $n = 96$ , 48.5%), were heterosexual ( $n = 179$ , 91.3%), Caucasian ( $n = 119$ , 60.1%), married ( $n = 69$ , 35.0%), reported having some college education ( $n = 64$ , 32.3%), and earned an annual income between \$25,000 and \$50,000 ( $n = 70$ , 35.4%). Of those 198 participants with orthorexic symptomology, 64 (32.3%) received scores below 35, with 8 (4%) scoring below 30, which are both evidence of more severe ON symptomology.

The majority of participants who did not present with orthorexic symptomology were also between the ages of 21-30 ( $n = 69$ , 35.4%), were also heterosexual ( $n = 181$ , 92.3%), also Caucasian ( $n = 116$ , 58.6%), also reported having some college education ( $n = 60$ , 30.2%), and also earned an annual income between \$25,000 and \$50,000 ( $n = 69$ , 34.5%). In contrast to those presenting with ON symptomology, these participants were single ( $n = 88$ , 44.0%). Thus, the only difference between the two groups was relationship status.

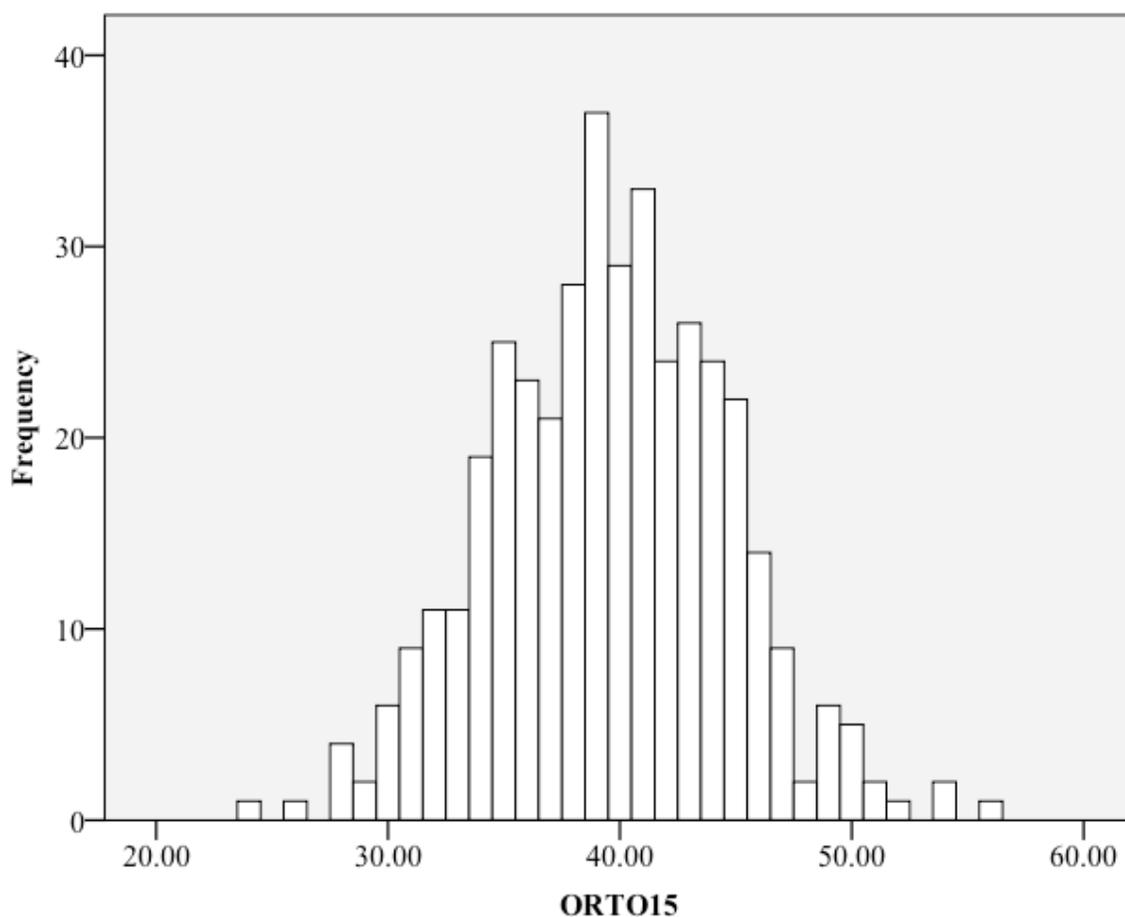


Figure 1. Frequency distribution of ORTO-15 scores.

### NEO Five-Factor Inventory-3 (NEO-FFI-3)

Reliability analysis of the NEO-FFI-3 indicated a Cronbach's alpha of .72, indicating sufficient internal consistency of the measure. The mean NEO-FFI-3 *T* score for Neuroticism was 67.1,  $SD = 6.53$  ( $N = 332$ ), indicating that this sample is more likely to be experiencing psychological distress compared to the general population. The mean *T* score for Extraversion was 66.4,  $SD = 5.93$  ( $N = 332$ ), indicating that this sample is higher in the level of energy put into social interactions

compared to the general population. The mean  $T$  score for Openness to Experience was 64.5,  $SD = 5.96$  ( $N = 332$ ), indicating that this sample is more interested in aesthetics, feelings, and experience seeking than the general population. The mean  $T$  score for Agreeableness was 53.3,  $SD = 9.95$  ( $N = 332$ ), indicating that this sample has a balance of compassion and tough-mindedness. Finally, the mean  $T$  score for Conscientiousness was 64.3,  $SD = 5.61$  ( $N = 332$ ), indicating that this sample was more oriented and motivated toward goal directed behavior than the general population (see Table 3).

## Hypotheses

### Hypothesis 1

It was hypothesized that there would be a significant negative correlation between Neuroticism scores on the NEO-FFI-3 (McCrae et al., 2005) and scores on the ORTO-15 (Donini et al., 2005). Thus, higher levels of Neuroticism would be significantly related to disordered behavior of the orthorexic type as indicated by lower scores on the ORTO-15. This hypothesis was supported. A significant negative relationship was found for scores on the ORTO-15 and  $T$  scores for N,  $r(332) = -.25$ ,  $p < .001$ . Intercorrelations among scores can be found in Table 3.

### Hypothesis 2

It was hypothesized that there would be a significant negative correlation between Conscientiousness scores on the NEO-FFI-3 (McCrae et al., 2005) and scores on the ORTO-15 (Donini et al., 2005). Thus, higher levels of Conscientiousness would be significantly related to disordered behavior of the

orthorexic type as indicated by lower scores on the ORTO-15. This hypothesis was not supported. No significant relationship was found for scores on the ORTO-15 and *T* scores for C,  $r(332) = -.02, p = .71$ . Intercorrelations among scores can be found in Table 3.

### Exploratory Analysis of the Domains of O, E, and A

Exploratory analysis of the other domains of O, E, and A revealed a marginally significant relationship for scores on the ORTO-15 and *T* scores for O,  $r(332) = -.09, p = .09$ . No significant relationships were found for and A,  $r(332) = -.08, p = .15$  and E,  $r(332) = .03, p = .57$ . Intercorrelations among scores can be found in Table 3.

Table 3

#### *Intercorrelation of Scores on the ORTO-15 and NEO-FFI-3*

	ORTO-15	N	E	O	A	C
ORTO-15	----					
N	-.25**	----				
E	.03	.15**	----			
O	-.09	.31**	.52**	----		
A	-.08	.48**	.36**	.47**	----	
C	-.02	.09	.46**	.39**	.28**	----

*Note.*  $N = 332$ .

\*\* $p < .001$

### Multiple Regression Analysis

In order to determine if there was a unique relationship between the independent/predictor variables of N, C, O, E, and A and the dependent variable of scores on the ORTO-15, data were analyzed using simultaneous multiple regression. Altogether, this model explained a significant portion of the variance (6.0%) in ORTO-15 scores,  $\text{Adj. } R^2 = .06$ ,  $F(5, 326) = 5.00$ ,  $p < .001$ . ORTO-15 scores were predicted by N ( $\beta = -.26$ ,  $p < .001$ ), but not by C ( $\beta = -.03$ ,  $p = .60$ ) or O ( $\beta = -.08$ ,  $p = .24$ ). ORTO-15 scores were also marginally predicted by E ( $\beta = .11$ ,  $p = .11$ ), but not by A ( $\beta = .06$ ,  $p = .41$ ). This indicates that behavior of the orthorexic type was significantly predicted by N, and marginally predicted by E, but not by C, O or A. Further simultaneous multiple regression analysis for exploratory means using age as a predictor of orthorexic symptomology along with the same NEO traits was also conducted. Altogether, this model explained a significant portion of the variance (7.2%) in ORTO-15 scores,  $\text{Adj. } R^2 = .072$ ,  $F(6, 322) = 5.23$ ,  $p < .001$ . ORTO-15 scores were predicted by age ( $\beta = .13$ ,  $p = .02$ ) and N ( $\beta = -.18$ ,  $p < .001$ ), marginally predicted by E ( $\beta = .12$ ,  $p = .08$ ), but not by O ( $\beta = -.09$ ,  $p = .18$ ) and C ( $\beta = -.06$ ,  $p = .36$ ) or A ( $\beta = .89$ ,  $p = .38$ ). This indicates that behavior of the orthorexic type is also significantly predicted by age, as well as N.

## CHAPTER IV

### DISCUSSION

#### **Summary of Results in Relation to Previous Research**

The purpose of this study was to determine if there was a relationship between ON and the Big Five personality traits of N and C, along with exploratory analysis of O, E and A. It was hypothesized that there would be a significant negative correlation between N and C scores on the NEO-FFI-3 (McCrae et al., 2005) and scores on the ORTO-15 (Donini et al., 2005). Thus, higher levels of N and C would significantly be related to disordered behavior of the orthorexic type as indicated by lower scores on the ORTO-15. The hypothesis related to N was supported, but not the hypothesis related to C. A significant negative correlation was found between scores on the ORTO-15 and N, as well as a marginally significant negative correlation between scores on the ORTO-15 and O, however no correlation was found between scores on the ORTO-15 and C, E, and A. Further analysis indicated that N is a significant predictor of ON scores, but C, O, E, and A are not. Further exploratory analysis determined that age was also a significant predictor of ORTO-15 scores.

To the best of this author's knowledge and a thorough search of the literature, this is the first study that has examined Big Five personality traits in relation to ON, thus it is impossible to imply that these findings are consistent with previous literature as it pertains to ON. Therefore, a discussion of the ways that these results align with other studies of Big Five personality traits and other eating disorders such as AN, BN, and BED is appropriate here. Ghaderi and Scott (2000) stated that the traits of N, C,

and O have been deemed as risk factors in the development of ED pathology at one time or another, with N consistently found the most often. Contrary to the present study, Brookings and Wilson (1994) found few significant correlations between O and ED, and those that were found were all negative. Similar to the findings of the present study, Bollen and Wojciechowski (2004) found no significant relationships on C between individuals diagnosed with AN and controls. When looking at the differences among ED groups of AN-R, AN-B, and BN, Tasca et al., (2009) found significant differences on N and C. Regardless of the ED type, all participants in the clinical sample had significantly higher scores on N, with participants diagnosed with AN-R scoring higher on C than those with BN. Participants with AN-R scored significantly higher on C than those with AN-B (Tasca et al., 2009). No significant differences between group effects were found for O. These previous studies confirm that personality characteristics of C and N are important when considering a diagnosis of an eating disorder. This is in line with all other previous ED diagnostic criteria from the DSM-IV (American Psychiatric Association, 2000) in that N characteristics are always important to consider. Given the results of the present study, this strongly suggests the same with regard to ON symptoms in that personality characteristics associated with being significantly more anxious and neurotic than average on N can be found in those who exhibit ON characteristics. The marginal nature of the finding for O may be attributed to the implication that those with orthorexic symptomology are open to diets and eating behaviors that are proposed to improve the quality of their health. Individuals with high O are described as being artistic, curious,

insightful, imaginative, and are willing to engage in unusual thought processes and express their thoughts and values (McCrae & John, 1992). This suggests that there may be some aspects of O to consider in future research, perhaps with a more specific look at the subscales. Contrary to expectations, whatever is measured by C in this version of the NEO is not attributive or important, however, subscales may be found to be of interest in future research.

### **Specific Findings Pertaining to ON**

Overall, when looking specifically at ORTO-15 scores, it was determined that a 49.7% prevalence rate of ON symptomology was found among the participants ( $N = 198$ ). Of these 198 participants, 32.3% ( $n = 64$ ) expressed more severe ON pathology). Of those 64 participants, 12.5% ( $n = 8$ ) scored in the range associated with extremely severe ON pathology. These implications are based on the diagnostic criteria as determined by Donini et al. (2004, 2005). Individuals who score below 40 on the ORTO-15 are considered to have orthorexic symptomology, with scores below 35 considered to have severe symptoms. The prevalence of ON found in this study is much higher than that originally found in the Donini et al. (2004) study, where only a 6.9% prevalence rate was found. The Donini et al. finding is similar to Arusoğlu et al. (2008) as well, where only a 6.3% prevalence rate was found. The prevalence rates in the present study are consistent with those found by Bosi et al. (2007), where the prevalence rate was 45%. Other studies using the ORTO-15, the ORTO-11, and the ORTO-10 have shown similar variations in prevalence rates. Ramaciotti et al. (2011) found a prevalence rate of 57.6% out of 177 participants, while Kinzi et al. (2006)

only found a prevalence rate of 12.8% out of 283 participants. Aksoydan and Camci (2009) found a 56.4% prevalence rate out of 94 participants, Fidan et al. (2010) found 36.9% out of 878 participants, and Varga and Máté (2009, as cited in Brytek-Matera, 2012) found a 56.9% prevalence rate in a sample of university students. As previously noted, the actual number of participants was not referred to in the Brytek-Matera (2012) study, only the percentage found. Specific details of the aforementioned studies have been previously noted in the introduction portion of the present study. It is important to note here that the varying methods of measurement used, not to mention the variety of ways that measurements were determined in different studies based on varying threshold cutoffs creates a state of uncertainty as to whether or not accurate comparisons of these prevalence rates are deemed appropriate. Regardless, it is clear that the prevalence rate in the present study is fairly similar, and in some cases much higher, to that of other studies conducted. Furthermore, this implies that there may be problems with the ORTO-15 itself. This opens the door for consideration that it is fairly probable that Bratman (1997) may have been correct in his implications that ON was becoming a problematic issue in the U.S., and as such, warrants further study.

When comparing the overall general demographics of participants who exhibit orthorexic symptomology with those in previous studies, it was determined that this sample was predominantly female, versus male as in previous literature (Arusoğlu et al., 2008; Bosi et al., 2007; Donini et al., 2004, 2005) as noted earlier in this thesis, and may be due to cultural differences. It well known that women in the U. S. are

more inclined to be diagnosed with an eating disorder than men. (Klein & Walsh, 2003); therefore, the same may be said for ON. The average age for those with orthorexic symptomology in the present study was fairly consistent with that of previous studies (Arusoğlu et al., 2008; Bosi et al., 2007; Donini et al., 2004, 2005). Overall, the present study determined that younger participants were more likely to exhibit ON symptomology. The predominant relationship status for participants with orthorexic symptomology in the present study was that of single. This is not consistent with the Donini et al. (2004, 2005) studies, in that the majority of participants with orthorexic symptomology reported being widowed. Relationship status of participants with orthorexic symptomology was not reported in either the Bosi et al. (2007) or the Arusoğlu et al. (2008) studies. The majority of participants in the present study with orthorexic symptomology reported education levels of some college. Although education levels as compared to ON scores were reported in previous studies (Arusoğlu et al., 2008; Bosi et al., 2007; Donini et al., 2004, 2005), it is not feasible to compare the results of the present study to those studies in that the U.S. education system varies from the European education system in such a vast way, it is virtually impossible to align the two systems. The majority of participants with orthorexic symptomology in the present study were Caucasian. Seeing as how all previous studies have been conducted in Europe, and the participants were more homogeneously of European descent (Arusoğlu, et al., 2008; Bosi et al., 2007; Donini et al., 2004, 2005), an adequate comparison between the present study and previous studies cannot be made. The majority of the participants with orthorexic

symptomology in the present study identified as heterosexual. Sexual orientation was not determined in previous studies, thus no comparison between the present study and previous studies can be made.

### **Specific Findings Pertaining to ON, Personality, and Eating Demographics**

It is of great interest to this author that 75% ( $n = 149$ ) of the participants with orthorexic symptomology ( $N = 198$ ) in the present study scored higher on average on the three personality traits of N, C, and O as compared to the general population. It is important to note, however, that in general this was true of the sample as a whole. Seeing as how this is the first study of this nature to this author's best knowledge, no barometer has been set from which to draw comparisons or conclusions. One can only speculate at this time as to why such is the case. Therefore, the following implications are proposed. It is possible that the sample itself is high in these personality traits regardless of whether or not ON is present. Correlation analysis did confirm the sample as having high N in relationship to ORTO-15 scores, with marginal significance pertaining to O. C, however, was not significant. Therefore, individual *T* scores on N, O, and C only allow observation of personality alone, and not the actual relationship between personality and ON.

Another implication is that the participants who were part of the MTURK group were attracted to this particular job due to the nature of it being about obsessive eating behavior, and as such, display characteristics that are already consistent with such. The examination of such relationships is further warranted in order to fully understand these proposed implications.

Furthermore, when comparing the participants with orthorexic symptomology in the present study in regard to eating disorders in general, on average this sample is not comparable (0.08%,  $n = 16$ ) to that of the overall general population. Statistics show that approximately 1% of female adolescents are diagnosed with AN, approximately 5% of college-aged women are diagnosed with BN, and approximately 10% of those diagnosed with either AN or BN are male (Anorexia Nervosa and Related Eating Disorders, ANRED, 2011). In regard to participants with orthorexic symptomology in the present study diagnosed with food allergies (17.2%,  $n = 34$ ), this is higher as compared to the general population in that only 3% to 4% are believed to actually have a food allergy of some sort (WebMD, 2014). It is important to note here that the average age of this sample was older ( $M = 32.32$ ) than that of the general population referred to above, therefore a closer examination should be made into younger age groups and their potential to present with ON. It may also be feasible that the explanation for the higher percentage of those diagnosed with food allergies in the present study may be related to ON, as both result in restrictive eating choices and behaviors. A closer examination of a larger sample randomly selected from the population would allow a more in-depth examination of this implication.

### **Strengths and Limitations**

#### **Strengths**

As previously stated, to the best of this author's knowledge this is the first study of its kind to examine the relationship between ON and Big Five personality traits. A study of this nature has taken a step beyond the scope of simply looking at

eating habits, and has placed the focus on the relationship of ON symptomology and of participants' personality traits. Furthermore, this study is also the first of its kind to examine ON and its potential prevalence in the U.S. All previous empirically based studies have been conducted in Europe, thus limiting the scope of how ON may be affecting participants from another geographical population. In addition, this study examined demographics such as sexual orientation and ethnicity, both of which have not been addressed in previous studies. This was important in that the U.S. is composed of a very diverse population, and as such, these particular demographics should be taken into consideration.

### **Limitations**

Several limitations encountered in the present study should be noted. The first limitation is the sample itself. The pool of participants was limited to two sources, MTURK and students from California State University, Stanislaus. In both cases the participants were offered incentives to participate and this may have resulted in a biased sample. Furthermore, the nature of how the MTURK system works may have created an atmosphere that was not conducive to full and complete disclosure on the part of the participants. Each participant is paid based on the number of jobs they complete; as such, this may have caused some of them to rush through the survey with the intent to move on to the next job, potentially compromising the answers given. Several participants may have chosen to not fully complete the survey due to what they may have considered a small amount of payment being offered, thus providing incomplete and insufficient data. Regardless, previous research comparing

MTURK participants and those recruited in more traditional ways have found little to no significant differences between both groups in regard to results obtained from other online domains, as well as in offline conditions (Buhrmester, Kwang, & Gosling, 2011; Mason & Suri, 2011).

It is possible that the topic itself was of interest to individuals that pay closer attention to their eating habits and resulted in a larger percentage of the sample being placed in the ON symptomatology range. It is also unclear as to why a number of people said they had been diagnosed with ARFID when its inclusion in the DSM-5 (American Psychiatric Association, 2013) is as recent as last year. As such, a more careful inclusion of a sample with verified ED diagnoses would strengthen future studies.

Another limitation is that of the limited amount of research that has been done in this area. ON is a very newly described disorder, and as such, is just now attracting attention within the last seventeen years. Therefore, the extant literature was somewhat limited. Furthermore, the majority of the research that has been done comes from European samples, not U.S. samples. Thus, it is difficult to generalize previous research to populations in the United States.

A third limitation lies in the fact that the present study was a correlational study. Therefore, cause and effect cannot be inferred.

Finally, one must speculate as to the validity of the ORTO-15 (Arusoğlu et al., 2008; Bosi et al., 2007). This measure has been translated from several different languages to English on numerous occasions, potentially compromising its reliability

and validity. The version used in the present study is the first translation from Italian to English, thus minimizing the over-translation process; however, the English translation leaves much to be desired. For example, it is clear that at least one item on the measure (#15) presents a confound. The item asks if the participant eats alone when dining; this question does not take into consideration whether or not the individual is single, divorced, widowed, etc. If the participant answered in a positive manner to this question, this automatically contributed to the orthorexic symptomology score. This in itself is flawed; just because an individual dines alone does not necessarily mean that they are symptomatic of ON. Overall, the wording of some questions on the measure is vague and potentially misleading, and as such may not accurately distinguish between what may simply be considered healthy eating habits versus that of obsessive and restrictive behavior. Furthermore, the ORTO-15 as constructed by Donini et al. (2005) does not distinguish between those who present with orthorexic behavior (“health fanatic” eating behavior along with elevated Scale 7 levels) and those with “health fanatic” eating behavior along with normal Scale 7 levels. This led to higher threshold cut-off levels that may have artificially increased the validity of the measure, thus compromising its overall construct validity. Therefore, it is difficult to attach meaning to the results garnered in the present study based on the criteria designated by Donini et al. (2004, 2005).

### **Future Research**

Future research should include larger sample sizes, as well as random sampling processes across the general population in order to obtain further validation

for the ORTO-15. It is also likely that the ORTO-15 should be revised in order to obtain a more accurate perspective as to the nature of ON. In its current state the measure is unable to distinguish between those with compulsive, phobic tendencies, which was considered part of the original definition of ON (Donini et al., 2004). It has already been suggested by Arusoğlu et al. (2008) that items that assess obsessive-compulsive behaviors be added to the scale. This author is in agreement with that suggestion. Furthermore, the measure has been written and translated various times from one language to another, thus potentially compromising its accuracy. Utilizing a sample that is larger and random would also allow for the potential of obtaining a broader range of scores on the NEO-FFI-3. Based on the findings of the present study that N is predictive of ON, but not C, interaction analyses between N, C, and ON outcome should be conducted in order to examine what affect, if any that C may have among those who score high in N. Also, using a different form of the NEO, such as the NEO-PI-R would allow subscales of the NEO to be examined, thus allowing a closer look at the specific traits that might be associated with ON characteristics. Furthermore, a comparison of Big Five personality traits to the EES-11 as utilized in the Donini et al. (2004, 2005) studies would allow for an examination of emotional factors that may overlap with personality traits in regard to ON symptomology. It would be productive to run a study that included a group with verified ED diagnoses, as this would allow for an examination of specific ED characteristics that may present in those with orthorexic symptomology. A study examining a group with verified food allergy diagnoses is also warranted. There is controversy pointing to confusion

between bona fide food allergies versus that of general sensitivity (Björkstén, 2004), and as such, may require closer examination. It is not unrealistic to propose that those who self diagnose with food allergies may actually be presenting with high N, which should also be examined. Due to the diverse nature of the U.S. population, it would be of interest to examine how culture may be instrumental in the onset of ON. It has already been noted in previous studies that further study in regard to the obsessive-compulsive component as it relates to ON should be conducted (Bosi et al., 2007; Donini et al., 2004, 2005). This author is in agreement with this suggestion. An obsessive-compulsive component appears to be evident to some extent with the European populations; however, no studies have been conducted in the U.S. to make a comparison between the populations. Finally, qualitative research in the form of case studies could be conducted using specific participants from the present study who were willing to be contacted in the future based on their responses. A study of this nature would allow researchers to more fully examine the intricacies of ON on an individual case basis.

## REFERENCES

## REFERENCES

- Adambegan, M., Wagner, G., Nader, I. W., Fernandez-Aranda, F., Treasure, J., & Karwautz, A. (2012). Internalizing and externalizing behaviour problems in childhood contribute to the development of anorexia and bulimia nervosa: A study comparing sister pairs. *European Eating Disorders, 20*, 116-120.  
doi:10.1002/erv.1152
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211.  
Retrieved from <http://www.sciencedirect.com/science/journal/07495978>
- Aksoydan, E., & Camci, N. (2009). Prevalence of orthorexia nervosa among Turkish performance artists. *Eating and Weight Disorders, 14*, 33-37. Retrieved from <http://www.springer.com/medicine/psychiatry/journal/40519>
- Allison, K. C., Grilo, C. M., Masheb, R. M., & Stundard, A. J. (2005). Binge eating disorder and night eating syndrome: A comparative study of disordered eating. *Journal of Consulting and Clinical Psychology, 73*, 1107-1115.  
doi:10.1037/0022-006X.73.6.1107
- Allport, G. W. (1937). *Personality: A psychological interpretation*. New York: Holt, Rinehart and Winston.
- Altekruse, S. F., Timbo, B. B., Headrick, M. L., & Klontz, K. C. (1995). Associations between diet and health behavior: Results from the 1992 Rhode Island

behavioral risk factor survey. *Journal of Behavioral Medicine*, 18, 225-232.

Retrieved from <http://www.springer.com/medicine/journal/10865>

American Academy of Pediatrics. (1977). Nutritional aspects of vegetarianism, health foods, and fad diets. *Pediatrics*, 59, 460-464. Retrieved from

<http://pediatrics.aappublications.org>

American Psychiatric Association. (1980). *Diagnostic and statistical manual for mental disorders* (3<sup>rd</sup> ed.). Washington DC: Author.

American Psychiatric Association. (2000). *Diagnostic and statistical manual for mental disorders* (4th ed., text rev.). Washington DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual for mental disorders* (5th ed.). Washington, DC: Author.

Anorexia Nervosa and Related Eating Disorders. (2011). *Statistics: How many people have eating disorders?* Retrieved from <http://www.anred.com/stats.html>

Antony, M. M., Johnson, W. G., Carr-Nangle, R. E., & Abel, J. L. (1994).

Psychopathology correlates of binge eating and binge eating disorder.

*Comprehensive Psychiatry*, 35, 386-392. doi:10.1016/0010-440X(94)90280-1

Arnow, B., Kenardy, J., & Agras, W. S. (1995). The emotional eating scale: The development of a measure to assess coping with negative affect by eating.

*International Journal of Eating Disorders*, 18, 79-90. Retrieved from

[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-)

108X;jsessionid=A8C4DF9F5A5E84EB28CDC04216514537.d02t02

- Arusoglu, G., Kabakçi, E., Köksal, G., & Kutluay Merdol, T. (2008). Orthorexia nervosa and adaptation of ORTO-11 into Turkish. *Turkish Journal of Psychiatry, 19*, 1-9. Retrieved from <http://www.turkpsikiyatri.com/en/default.aspx?modul=home>
- Ashton, M. & Lee, K. (2008). The HEXACO model of personality structure. *Social and Personality Psychology Compass, 2*, 1952. doi:10.1111/j.1751-9004.2008.00134.x
- Attia, E., Becker, A. E., Bryant-Waugh, R., Hoek, H. W., Kreipe, R. E., Marcus, M. D., . . . Wonderlich, S. (2013). Feeding and eating disorders in DSM-5. *American Journal of Psychiatry, 170*, 1237-1239. doi:10.1176/appi.ajp.2013.13030326
- Babicz-Zielińska, E. (1996). Role of psychological factors in food choice: A review. *Polish Journal of Food and Nutrition Sciences, 15*, 379-384. Retrieved from <http://journal.pan.olsztyn.pl>
- Bast. (2002). *The Business of Bliss: The Relationship Between Tantra and Raw Food*. Retrieved April 29, 2014 from <http://living-foods.com/articles/tantraraw.html>
- Beardsworth, A., & Keil, T. (1992). The vegetarian option: varieties, conversions, motives, and careers. *The Sociological Review, 40*, 253-293. doi:10.1111/j.1467-954X.1992.tb00889.x
- Beardsworth, A., & Keil, T. (1997). *Sociology on the menu: An invitation to the study of food and society*. London: Routledge.

- Becker, H.S. (1963). *Outsiders: Studies in the sociology of deviance*. New York: Free Press.
- Becoming a vegetarian. (2009). *Harvard Women's Health Watch*, 17, 4-6. Retrieved from [www.health.harvard.edu](http://www.health.harvard.edu)
- Bienvenu, O. J., Samuels, J. F., Costa, P. T., Reti, I. M., Eaton, W. W., & Nestadt, G. (2004). Anxiety and depressive disorders and the five-factor model of personality: A higher-and-lower-order personality trait investigation in a community sample. *Depression and Anxiety*, 20, 92-97. doi:10.1002/da.20026
- Björkstén, B. (2004). How allergenic is food? *Clinical Experimental Allergy*, 34, 673-675. doi:10.1111/j.1365-2222.2004.1936.x
- Blinder, B. J., Cumella, E. J., & Sanathara, V. A. (2006). Psychiatric comorbidities of female inpatients with eating disorders. *Psychosomatic Medicine*, 68, 454-462. doi:10.1097/01.psy.0000221254.77675.f5
- Bloks, H., Hoek, H. W., Callewaert, I., & van Furth, E. (2004). Stability of personality traits in patients who received intensive treatment for a severe eating disorder. *The Journal of Nervous and Mental Disease*, 192, 129-138. doi:10.1097/01.nmd.0000110284.12816.fe
- Boeing, H., Bechthold, A., Bub, A., Ellinger, S., Haller, D., Kroke, A., . . . Watzl, B. (2012). Critical review: Vegetables and fruit in the prevention of chronic diseases. *European Journal of Nutrition*, 51, 637-663. doi:10.1007/s00394-012-0380-y

- Bollen, E., & Wojciechowski, F. L. (2004). Anorexia nervosa subtypes and the big five personality factors. *European Eating Disorders Review, 12*, 117-121. doi:10.1002/erv.551
- Bosi, A. T. B., Çamur, D., & Güler, Ç. (2007). Prevalence of orthorexia nervosa in resident medical doctors in the faculty of medicine (Ankara, Turkey). *Appetite, 49*, 661-666. doi:10.1016/j.appet.2007.04.007
- Boyle, J. E. (2007). *Becoming vegetarian: An analysis of the vegetarian career using an integrated model of deviance*. (Doctoral dissertation, Virginia Polytechnic Institute and State University). Retrieved from [http://scholar.lib.vt.edu/theses/available/etd-05012007-04133/unrestricted/Boyle\\_Sociology\\_Dissertation\\_May071.pdf](http://scholar.lib.vt.edu/theses/available/etd-05012007-04133/unrestricted/Boyle_Sociology_Dissertation_May071.pdf)
- Bratman, S. (1997). *Original essay on Orthorexia*. Available at: [www.orthorexia.com]. Accessed November 6, 2011.
- Bratman, S., & Knight, D. (2000). *Health food junkies*. New York: Broadway Books.
- Brockmeyer, T., Holtforth, M. G., Bents, H., Kämmerer, A., Herzog, W., & Frederich, H. C. (2013). Interpersonal motives in anorexia nervosa: The fear of losing one's autonomy. *Journal of Clinical Psychology, 69*, 278-289. doi:10.1002/jclp.21937
- Brookings, J. B., & Wilson, J. F. (1994). Personality and family-environment predictors of self-reported eating attitudes and behaviors. *Journal of Personality Assessment, 63*, 313-326. Retrieved from <http://www.tandfonline.com/loi/hjpa20#.UmgZrkL3B6w>

- Brytek-Matera, A. (2012). Orthorexia nervosa: An eating disorder, obsessive-compulsive disorder or disturbed eating habit? *Archives of Psychiatry and Psychotherapy, 1*, 55-60. Retrieved from <http://www.worldcat.org/title/archives-of-psychiatry-and-psychotherapy/oclc/220954272>
- Buhrmester, M. D., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality data? *Perspectives on Psychological Science, 6*, 3-5. doi:10.1177/1745691610393980
- Bulik, C. M., Sullivan, P. F., Fear, J., & Pickering, A. (1997). Predictors of the development of bulimia nervosa in women with anorexia nervosa. *Archives of General Psychiatry, 37*, 1030-1035. doi:10.1097/00005053-199711000-00009
- Bulik, C. M., Sullivan, P. F., Joyce, P. R., & Carter, F. A. (1995). Temperament, character, and personality disorder in bulimia nervosa. *Journal of Nervous and Mental Disease, 183*, 593-598. doi:10.1097/00005053-199509000-00006
- Carrard, I., Van der Linden, M., & Golay, A. (2012). Comparison of obese and nonobese individuals with binge eating disorder: Delicate boundary between binge eating disorder and non-purging bulimia nervosa. *European Eating Disorders, 20*, 350-354. doi:10.1002/erv.217
- Cattell, R. B. Eber, H. W., & Tatsouoka, M. M. (1970). *Handbook for the 16 PF*. Champaign, IL: Institute for Personality and Ability Testing.

- Centers for Disease Control and Prevention. (2011). *2011 estimates of foodborne illness in the United States*. Retrieved from <http://www.cdc.gov/Features/dsFoodborneEstimates/>
- Claes, L., Vandereycken, W., Luyten, P., Soenens, B., Pieters, G., & Vertommen, H. (2006). Personality prototypes in eating disorders based on the big five model. *Journal of Personality Disorders, 20*, 401-416. Retrieved from [http://www.guilford.com/cgi-bin/cartscript.cgi?page=pr/jnpd.htm&dir=periodicals/per\\_psych](http://www.guilford.com/cgi-bin/cartscript.cgi?page=pr/jnpd.htm&dir=periodicals/per_psych)
- Costa, P. T., Jr., & McCrae, R. R. (1985). *The NEO personality inventory manual*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., Jr., & McCrae, R. R. (1989). *The NEO-PI/NEO-FFI manual supplement*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., Jr., & McCrae, R. R. (1992). *NEO inventories for the NEO personality inventory-revised (NEO-FFI-3)*. Lutz, FL: Psychological Assessment Resources.
- DaCosta, M., & Halmi, K. A. (1992). Classifications of anorexia nervosa: Question of subtypes. *International Journal of Eating Disorders, 11*, 305-313. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-108X/issues](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-108X/issues)
- Deary, I. J., Peter, A., Austin, E., & Gibson, G. (1998). Personality traits and personality disorders. *British Journal of Psychology, 89*, 647-661. doi:10.1111/j.2044-8925.1998.tb02708.x

- Dennison, C. M., & Shepherd, R. (1995). Adolescent food choice: An application of the Theory of Planned Behavior. *Journal of Human Nutrition and Dietetics*, 8, 9-23. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1365-277X;jsessionid=07F6D6853CFE78346D752042434CCF84.f03t04](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-277X;jsessionid=07F6D6853CFE78346D752042434CCF84.f03t04)
- Devries, J. (2012). Making choices: Ethics and vegetarianism. *Dissent*, 59, 39-41. Retrieved from <http://www.dissentmagazine.org>
- Diaz-Marsa, M., Carrasco, J. L., & Saiz, J. (2000). A study of temperament and personality in anorexia and bulimia nervosa. *Journal of Personality Disorders*, 14, 352-359. doi:10.1521/pedi.2000.14.4.352
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41, 417-440. Retrieved from <http://www.annualreviews.org/journal/psych>
- 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 Weight Disorders*, 9, 151-157. Retrieved from <http://www.kurtis.it/ewd/it/>
- Donini, L. M., Marsili, D., Graziani, M. P., Imbriale, M., & Cannella, C. (2005). Orthorexia nervosa: Validation of a diagnosis questionnaire. *Eating Weight Disorders*, 10, 28-32. Retrieved from <http://www.kurtis.it/ewd/it/>

- Eddy, K. T., Keel, P. K., Dorer, D. J., Delinsky, S. S., Franko, D. L., & Herzog, D. B. (2002). Longitudinal comparison of anorexia nervosa subtypes. *International Journal of Eating Disorders, 31*, 191-201. doi:10.1002/eat.10016
- Eisler, I., Dare, C., Hodes, M., Russell, G., Dodge, E., & Le Grange, D. (2000). Family therapy for adolescent anorexia nervosa: The results of a controlled comparison of two family interventions. *Journal of Child Psychology and Psychiatry, 41*, 727-736. doi:10.1176/appi.pn.2013.10b8
- Eisler, I., Dare, C., Russell, G. F., Szumkler, G., Le Grange, D., & Dodge, E. (1997). Family and individual therapy in anorexia nervosa. A 5-year follow-up. *Archives of General Psychiatry, 54*, 1025-1030. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9366659>
- Eng, J. (2005). Receiver operating characteristic analysis: A primer. *Academic Radiology, 12*, 909-916. doi:10.1016/j.acra.2005.04.005
- Epstein, L. H., Gordy, C. C., Raynor, H. A., Bedomme, M., Kilanowski, C. K., & Paluch, R. (2001). Increasing fruit and vegetable intake and decreasing fat and sugar intake in families at risk for childhood obesity. *Obesity Research, 9*, 171-178. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1930-739X](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1930-739X)
- Eysenck, H. J. (1981). *A model for personality*. Berlin: Springer-Verlag.
- Eysenck, H. J., & Eysenck, S. B. G. (1972). *Manual of the Eysenck Personality Questionnaire*. San Diego: Educational and Industrial Testing Service.

- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, *16*, 363-370. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-108X;jsessionid=0DC34B51F328752B15ACA95BE78BA59C.f02t01](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-108X;jsessionid=0DC34B51F328752B15ACA95BE78BA59C.f02t01)
- Fairburn, C. G., & Cooper, Z. (1993). The eating disorder examination (12<sup>th</sup> ed.). In C. F. Fairburn & G. T. Wilson (Eds.), *Binge eating: Nature, assessment, and treatment* (pp. 317-360). New York: Guilford Press.
- Fairburn, C. G., & Harrison, P. J. (2003). Eating disorders. *Lancet*, *361*, 407-416. Retrieved from <http://www.thelancet.com>
- Fairburn, C. G., Norman, P. A., Welch, S. L., O'Connor, M. E., Doll, H. A., & Peveler, R. C. (1995). A prospective study of outcome in bulimia nervosa and the long-term effects of three psychological treatments. *Archives of General Psychiatry*, *52*, 304-312. doi:10.1001/archpsyc.1995.03950160054010
- Fairburn, C. G., Welch, S. L., Doll, H. A., Davies, B. A., & O'Connor, M. E. (1997). Risk factors for bulimia nervosa. A community-based case-control study. *Archives of General Psychiatry*, *54*, 509-517. Retrieved from <http://archpsyc.jamanetwork.com/journal.aspx>
- Feeding and eating disorders. (2013). In *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V). Retrieved from <http://www.dsm5.org/Documents/Eating%20Disorders%20Fact%20Sheet.pdf>

- Fidan, T., Ertekin, V., Işıkay, S., & Kirpınar, I. (2010). Prevalence of orthorexia among medical students in Erzurum, Turkey. *Comprehensive Psychiatry*, *51*, 49-54. doi:10.1016/j.comppsy.2009.03.001
- Fisher, M. M. (2014). Avoidant/restrictive food intake disorder. *Eating Disorders Review*, *25*, 2. Retrieved from <http://eatingdisordersreview.com>
- Frank, E., Winkleby, M., Fortmann, S. P., & Farquhar, J. W. (1993). Cardiovascular disease risk factors: Improvements in knowledge and behavior in the 1980s. *The American Journal of Public Health*, *83*, 590-593. Retrieved from <http://ajph.aphapublications.org>
- Garner, D. M., & Garfinkle, P. E. (1979). The eating attitude test: An index of the symptoms of anorexia nervosa. *Psychological Medicine*, *9*, 273-279. Retrieved from <http://journals.cambridge.org/action/displayJournal?jid=PSM>
- Garner, D. M., & Olmstead, M. P. (1984). *Manual for the eating disorder inventory*. Odessa, FL: Psychological Assessment Resources.
- Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkle, P. E. (1982). The eating attitudes test: Psychometric features and correlates. *Psychological Medicine*, *12*, 871-878. Retrieved from <http://www.speciation.net/Database/Journals/Psychological-Medicine-;i2838>
- Geller, J., Johnston, C., Madsen, K., Goldner, E. M., Remick, R. A., & Birmingham, C. L. (1998). Shape-and-weight-based self-esteem and the eating disorders. *International Journal of Eating Disorders*, *24*, 285-298. doi:10.1002/(SICI)1098-108X(199811)24:3<285::AID-EAT6>3.0.CO;2-I

- Ghaderi, A., & Scott, B. (2000). The big five and eating disorders: A prospective study in the general population. *European Journal of Personality, 14*, 311-323. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1099-0984;jsessionid=12A626B3802114AC187D35138F67AEF4.f03t04](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-0984;jsessionid=12A626B3802114AC187D35138F67AEF4.f03t04)
- Goldberg, L. R. (1990). An alternative “description of personality”: The big-five factor structure. *Journal of Personality and Social Psychology, 59*, 1216-1229. doi:10.1037/0022-3514.59.6.1216
- Goldfein, J. A., Walsh, B. T., & Midlarsky, E. (2000). Influence of shape and weight on self-evaluation in bulimia nervosa. *International Journal of Eating Disorders, 24*, 285-298. doi:10.1002/(SICI)1098-108X(200005)27:4<435::AID-EAT8>3.0.CO;2-2
- Goldner, E. M., Srikameswaran, S., Schroeder, M. L., Livesley, W. J., & Birmingham, C. L. (1999). Dimensional assessment of personality pathology in patients with eating disorders. *Psychiatry Research, 85*, 151-159. doi:10.1016/S0165-1781(98)00145-0
- Götestam, K. G., & Agras, W. S. (1995). General population-based epidemiological study of eating disorders in Norway. *International Journal of Eating Disorders, 18*, 119-126. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-108X;jsessionid=A8C4DF9F5A5E84EB28CDC04216514537.d02t02](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-108X;jsessionid=A8C4DF9F5A5E84EB28CDC04216514537.d02t02)

- Grilo, C. M., Hrabosky, J. I., White, M. A., Allison, K. C., Stunkard, A. J., & Masheb, R. M. (2008). Overvaluation of shape and weight in binge eating disorder and overweight controls: refinement of a diagnostic construct. *Journal of Abnormal Psychology, 117*, 414-419. doi:10.1037/0021-843X.117.2.414
- Grobe, D., & Raab, C. (2004). Voter's response to labeling genetically engineered foods: Oregon's experience. *The Journal of Consumer Affairs, 38*, 320-331. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1745-6606](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1745-6606)
- Guerdjikova, A. I., O'Melia, A. M., Mori, N., McCoy, J., & McElroy, S. L. (2012). Binge eating disorder in elderly individuals. *International Journal of Eating Disorders, 45*, 905-908. doi:10.1002/eat.22028
- Halmi, K. A., Sunday, S. R., Strober, M., Kaplan, A., Woodside, D. B., Fichter, M., ... Kaye, W. H. (2000). Perfectionism in anorexia nervosa: Variation by clinical subtype, obsessionality, and pathological eating behavior. *American Journal of Psychiatry, 157*, 1799-1805. doi:10.1176/appi.ajp.157.11.1799
- Hambrecht, R., & Gielen, S. (2005). Hunter-gatherer to sedentary lifestyle. *Medicine and Sport, 366*, 560-561. Retrieved from [www.thelancet.com](http://www.thelancet.com)
- Hathaway, S. R., & McKinley, J. C. (1940). A multiphasic personality schedule (Minnesota): I. Construction of the schedule. *Journal of Psychology, 10*, 249-254. Retrieved from <http://www.tandfonline.com/toc/vjrl20/current#.UbXqSkL3A10>

- Heaven, P. C. L., Mulligan, K., Merrilees, R., Woods, T., & Fairouz, Y. (2001). Neuroticism and conscientiousness as predictors of emotional, external and restrained eating behaviors. *International Journal of Eating Disorders, 30*, 161-166. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-108X/issues](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-108X/issues)
- Herencia, J. F., Garcia-Galavis, P. A., Ruiz Dorado, J. A., & Maqueda, C. (2011). Comparison of nutritional quality of the crops grown in an organic and conventional fertilized soil. *Scientia Horticulturae, 129*, 882-888. doi:10.1016/j.scienta2011.04.008
- Hodgson, R. J., & Rachman, S. (1977). Obsessional-compulsive complaints. *Behavior and Research Therapy, 15*, 389-395. Retrieved from <http://www.journals.elsevier.com/behaviour-research-and-therapy>
- Hoek, H. W. (1993). Review of epidemiological studies of eating disorders. *International Review of Psychiatry, 5*, 61-75. doi:10.3109/09540269309028295
- Hoekstra, H. A., Ormel, J., & de Fruyt, F. (1996). *NEO-PI-R en NEO FFI Big Five persoonlijkheidsvragenlijsten. Handleiding*. Amsterdam: Swets & Zeitlinger.
- Hrabosky, J. I., Masheb, R. M., White, M. A., & Grilo, C. M. (2007). Overvaluation of shape and weight in binge eating disorder. *Journal of Counseling and Clinical Psychology, 75*, 175-180. doi:10.1037/0022-006X.75.1.175

- 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*, 348-358. doi:10.1016/j.biopsych.2006.03.040
- Hudson, J. I., Lalonde, J. K., Berry, J. M., Pindyck, I. J., Bulik, C. M, Crow, S. J., ... Pope, H. G. Jr. (2006). Binge eating disorder as a distinct familial phenotype in obese individuals. *Archives of General Psychiatry, 63*, 313-319. doi:10.1001/archpsyc.63.3.313
- Kaplan, A. S. (2002). Psychological treatments for anorexia nervosa: A review of published studies and promising new directions. *Canadian Journal of Psychiatry, 47*, 235-242. Retrieved from <https://ww1.cpa-apc.org/publications/archives/cjp/2002/april/inReviewAnorexiaNervosa.asp>
- Karatzias, T., Chouliara, Z., Power, K., Collin, P., Yellowlees, A., & Grierson, D. (2010). General psychopathology in anorexia nervosa: The role of psychosocial factors. *Clinical Psychology and Psychotherapy, 17*, 519-527. doi:10.1002/app.701
- Kassett, J. A., Gershon, E. S., Maxwell, M. E., Guroff, J. J., Kazuba, D. M., Smith, A. L., ... Jimerson, D. C. (1989). Psychiatric disorders in the first-degree relatives of probands with bulimia nervosa. *American Journal of Psychiatry, 146*, 1468-1471. Retrieved from <http://ajp.psychiatryonline.org/journal.aspx?journalid=13>
- Kassett, J. A., Gwirtsman, H. E., Kaye, W. H., Brandt, H. A., & Jimerson, D. C. (1988). Pattern of onset of bulimic symptoms in anorexia nervosa. *American*

*Journal of Psychiatry*, 145, 1287-1288. Retrieved from  
<http://ajp.psychiatryonline.org/journal.aspx?journalid=13>

Keel, P. K., Holm-Denoma, J. M., & Crosby, R. D. (2011). Clinical significance and distinctiveness of purging disorder and binge eating disorder. *International Journal of Eating Disorders*, 44, 311-316. doi:10.1002/eat.20821

Kendler, K. S., Maclean, C., Neale, M., Kessler, R., Heath, A., & Evans, L. (1991). The genetic epidemiology of bulimia nervosa. *American Journal of Psychiatry*, 148, 1627-1637. Retrieved from  
<http://ajp.psychiatryonline.org/journal.aspx?journalid=13>

Kenney, L., & Walsh, T. B. (2013). Avoidant/restrictive food intake disorder (ARFID): Defining ARFID. *Eating Disorders Review*, 24, 1. Retrieved from  
<http://eatingdisordersreview.com>

Kinzi, J. F., Hauer, K., Traweger, C., & Kiefer, I. (2006). Orthorexia nervosa in dieticians. *Psychotherapy and Psychosomatics*, 75, 395-396.  
doi:10.1159/000095447.

Klein, D. A., & Walsh, B. T. (2003). Eating disorders. *International Review of Psychiatry*, 15, 205-216. doi:10.1080/0954026031000136839

Klimo, J. (2008). Toward an understanding of “breatharianism”. *Journal of Spirituality and Paranormal Studies*, 31, 63-77. Retrieved from  
<http://www.worldcat.org/title/journal-of-spirituality-and-paranormal-studies/oclc/67770638>

- Klump, K. L., Kaye, W. H., & Strober, M. (2001). The evolving genetic foundations of eating disorders. *Psychiatric Clinics of North America*, *24*, 215-225.  
doi:10.1016/S0193-953X(05)70218-5
- Klump, K. L., Wonderlich, S., Lehoux, P., Lilienfeld, L. R., & Bulik, C. M. (2002). Does environment matter? A review of non-shared environment and eating disorders. *International Journal of Eating Disorders*, *31*, 118-135.  
doi:10.1002/eat.10024
- Lappalainen, R., Kearney, J., & Gibney, M. (1998). A pan EU survey of consumer attitudes to food, nutrition and health: An overview.  
*Food Quality Preference*, *9*, 467-478. doi:10.1016/S0950-3293(98)00018-4
- Largen, K. L. (2009). A Christian rationale for vegetarianism. *Dialog: A Journal of Theology*, *48*, 147-157. doi:10.1111/j.1540-6385.2009.00450.x
- Lilienfeld, I. R., Stein, D., Bulik, C. M., Strober, M., Plotnicov, K., Pollice, C., ... Kaye, W. H. (2000). Personality traits among currently eating disordered, recovered and never ill first-degree female relatives of bulimic and control women. *Psychological Medicine*, *30*, 1399-1410. Retrieved from <http://www.speciation.net/Database/Journals/Psychological-Medicine-;i2838>
- Living and Raw Foods*. (1998). Retrieved May 3, 2013 from <http://www.living-foods.com/faq.html>
- Magkos, F., Arvaniti, F., & Zampelas, A. (2006). Organic food: Buying more safety or just peace of mind? A critical review of the literature. *Critical*

*Reviews in Food Sciences and Nutrition*, 46, 23-56.

doi:10.1080/10408690490911846

Mascola, A. J., Bryson, S. W., & Agras, W. S. (2010). Picky eating during childhood: A longitudinal study to age 11 years. *Eating Behavior*, 11, 253-257.

doi:10.1016/j.eatbeh.2010.05.006

Masheb, R. M., & Grilo, C. M. (2000). Binge eating disorder: A need for additional diagnostic criteria. *Comprehensive Psychiatry*, 41, 159-162.

doi:10.1016/S0010-440X(00)90041-5

Masheb, R. M., & Grilo, C. M. (2003). The nature of body image disturbance in patients with binge eating disorder. *International Journal of Eating Disorders*, 33, 333-341. doi:10.1002/eat.10139

Mason, W., & Suri, S. (2011). Conducting behavioral research on Amazon's Mechanical Turk. *Behavior Research Methods*, 44, 1-23. doi:10.3758/s13428-011-0124-6

Mathieu, J. (2005). What is orthorexia? *Journal of American Diet Association*, 105, 1510-1512. Retrieved from

<http://www2.us.elsevierhealth.com/inst/serve?db=home&id=jada>

Matza, D. (1969). *Becoming deviant*. Englewood Cliffs, NJ: Prentice Hall.

Maurer, D. (1997). *The vegetarian movement: Ideology and strategy in a collective identity movement*. (Unpublished doctoral dissertation. Southern Illinois University-Carbondale.

- McCabe, R. E., McFarlane, T., Polivy, J., & Olmsted, M. (2001). Eating disorders, dieting, and the accuracy of self-reported weight. *International Journal of Eating Disorders, 29*, 59-64. doi:10.1002/1098-108X(200101)29:1<59::AID-EAT9>3.0.CO;2-#
- McCrae, R. R., & Costa, P. T., Jr. (2004). A contemplated revision of the NEO five-factor inventory. *Personality and Individual Differences, 36*, 587-596. doi:10.1016/S0191-8869(03)00118-1
- McCrae, R. R., & Costa, P. T., Jr. (2007). Brief versions of the NEO-PI-3. *Journal of Individual Differences, 28*, 116-128. doi:10.1027/1614-0001.28.3.116
- McCrae, R. R., Costa, P. T., Jr., & Martin, T. A. (2005). The NEO-PI-3: A more readable revised NEO personality inventory. *Journal of Personality Assessment, 84*, 261-270. doi:10.1207/s15327752jpa8403\_05
- McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60*, 175-215. Retrieved from <http://www.apa.org/pubs/journals/psp/index.aspx>
- McIntosh, W. A. (1996). *Sociologies of food and nutrition*. New York: Plenum Press.
- Mehler, C., Wewetzer, C., Schulze, U., Warneke, A., Theisen, F., & Dittmann, R. W. (2001). Olanzapine in children and adolescents with chronic anorexia nervosa. A study of five cases. *European Child and Adolescent Psychiatry, 10*, 151-157. Retrieved from <http://link.springer.com/journal/787>
- Menifield, C. E., Doty, N., & Fletcher, A. (2008). Obesity in America. *The ABNF Journal, 19*, 83-88. Retrieved from <http://www.tuckerpub.com/abnf.htm>

- Mintz, S. W., & DuBois, C. M. (2002). The anthropology of food and eating. *Annual Review of Anthropology, 31*, 99-119.  
doi:10.1146/annurev.anthro.32.032702.131011
- Mitzman, S. F., Slade, P., & Dewey, M. E. (1994). Preliminary development of a questionnaire designed to measure neurotic perfectionism in the eating disorders. *Journal of Clinical Psychology, 50*, 516-522. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1097-4679](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1097-4679)
- Mond, J. M., Hay, P. J., Rodgers, B., & Owen, C. (2007). Recurrent binge eating with and without the “undue influence of weight or shape on self-evaluation”: Implications for the diagnosis of binge eating disorder. *Behavior Research and Therapy, 45*, 929-938. doi:10.1016/j.brat.2006.08.011
- Moos, R. H., & Moos, B. S. (1986). *Family environment scale manual* (2<sup>nd</sup> ed.). Palo Alto, CA: Consulting Psychologists Press.
- Morey, L. (1991). *Personality assessment inventory: Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Mussell, M. P., Mitchell, J. E., de Zwaan, M., Crosby, R. D., Seim, H. C., & Crow S. J. (1996). Clinical characteristics associated with binge eating in obese females: A descriptive study. *International Journal of Obesity and Related Metabolic Disorders, 20*, 324-331. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/8680459>
- Nasser, M. (1993). A prescription of vomiting: Historical footnotes. *International Journal of Eating Disorders, 13*, 129-131. Retrieved from

[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-108X;jsessionid=C2190E5083933E9F2A8AE662FD252A8B.f02t03](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-108X;jsessionid=C2190E5083933E9F2A8AE662FD252A8B.f02t03)

Norström, F., Sandtröm, O., Lindholm, L., & Ivarsson, A. (2012). A gluten-free diet effectively reduces symptoms and health care consumption in a Swedish celiac disease population. *BMC Gastroenterology*, *12*, 125-132.

doi:10.1186/1471-230X-12-125

Nymah, H. (2002). A direct question: Is orthorexia a correct word for a wrong concept? *Lakartidningen*, *99*, 433-434. Retrieved from

<http://www.lakartidningen.se>

O'Brien, K. M., & Vincent, N. K. (2003). Psychiatric comorbidity in anorexia and bulimia nervosa: Nature, prevalence, and causal relationships. *Clinical Psychology Review*, *23*, 57-74. doi:10.1016/S0272-7358(02)00201-5

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity in the United States, 2009-2010. NCHS data brief, no 82, Hyattsville, MD: National Center for Health Statistics.

*Overweight and obesity: U.S. obesity trends*. (2011, July 21). Retrieved November 6, 2011, Centers for Disease Control and Prevention website:

<http://www.cdc.gov/obesity/data/adult.html>

Palupi, E., Jayanegara, A., Ploeger, A., & Kahl, J. (2012). Comparison of nutritional quality between conventional and organic dairy products: A meta-analysis.

*Journal of the Science of Food and Agriculture*, *92*, 2774-2781.

doi:10.1002/jsfa.5639

- Patching, J., & Lawler, J. (2009). Understanding women's experiences of developing an eating disorder and recovering: A life-history approach. *Nursing Inquiry*, *16*, 10-21. doi:10.1111/j.1440-1800.2009.00436x
- Peters, R. L., Gurrin, L. C., & Allen, K. J. (2012). The predictive value of skin prick testing for challenge-proven food allergy: A systematic review. *Pediatric Allergy Immunology*, *23*, 347-352. doi:10.1111/j.1399-3038.2011.01237.x
- Phillips, F. (2005). Vegetarian nutrition. *Nutrition Bulletin*, *30*, 132-167. doi:10.1111/j.1467-3010.2005.00467.x
- Phillips, R. (1975). Role of life-style and dietary habits in risk of cancer among Seventh-Day Adventists. *Cancer Research*, *35*, 3513-3522. Retrieved from <http://cancerres.aacrjournals.org>
- Podar, I., Hannus, A., & Allik, J. (1999). Personality and affectivity characteristics associated with eating disorders: A comparison of eating disordered, weight preoccupied, and normal samples. *Journal of Personality Assessment*, *73*, 133-147. Retrieved from <http://www.psypress.com/journals/details/0022-3891/>
- Pope, H. G., Lalonde, J. K., Pindyck, I. J., Walsh, T., Bulik, C. M., Crow, S. J., ... Hudson, J. L. (2006). Binge eating disorder: A stable syndrome. *American Journal of Psychiatry*, *163*, 2181-2183. doi:10.1176/appi.ajp.163.12.2181
- Powers, P. S., Santana, C. A., & Bannon, Y. S. (2002). Olanzapine in the treatment of anorexia nervosa: An open label trial. *International Journal of Eating Disorders*, *32*, 146-154. doi:10.1002/eat.10084

- Pryor, T., & Wiederman, M. W. (1996). Measurement of non-clinical personality characteristics of women with anorexia nervosa or bulimia nervosa. *Journal of Personality Assessment, 67*, 414-421. Retrieved from <http://www.psypress.com/journals/details/0022-3891/>
- Pytlik Zillig, L. M., Hemenover, S. H., & Dienstbier, R. A. (2002). What do we assess when we assess a big 5 trait? A content analysis of the affective, behavioral, and cognitive processes represented in big 5 personality inventories. *Personality and Social Psychology Bulletin, 28*, 847-858. Retrieved from <http://www.sagepub.com/journals/Journal200808>
- Rammacciotti, C., Perrone, P., Coli, E., Burgalassi, A., Conversano, C., Massimetti, G., & Dell'Osso, L. (2011). Orthorexia nervosa in the general population: A preliminary screening using a self-administered questionnaire (ORTO-15). *Eating and Weight Disorders, 16*, e127-e130. Retrieved from [http://www.researchgate.net/journal/1124-4909\\_Eating\\_and\\_weight\\_disorders\\_EWD](http://www.researchgate.net/journal/1124-4909_Eating_and_weight_disorders_EWD)
- Raw Food Diet: Practice, Theory, and Evidence.* (2014). Retrieved April 29, 2014 from <http://www.wellness.com/reference/diet/raw-food-diet/practice-theory-and-evidence>
- Richards, M., Casper, R., & Larson, R. (1990). Weight and eating concerns among pre and adolescent boys and girls. *Journal of Adolescent Health Care, 11*, 161-161. Retrieved from <http://www.jahonline.org>

- Riley, M. (2004). The rise of vegetarianism. *Nutrition and Dietetics*, *61*, 9-10.  
Retrieved from [anjid.org.au](http://anjid.org.au)
- Robins, R. W., Fraley, R. C., Roberts, B. W., & Trzesniewski, K. H. (2001). A longitudinal study of personality in young adulthood. *Journal of Personality*, *69*, 617-640. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1467-6494](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-6494)
- Samuel, D. B., & Widiger, T. A. (2011). Conscientiousness and obsessive-compulsive personality disorder. *Personality Disorders: Theory, Research, and Treatment*, *2*, 161-174. doi:10.1037/a0021216
- Saucier, G. (1994). Mini-markers: A brief version of Goldberg's unipolar big-five markers. *Journal of Personality Assessment*, *63*, 506-516. Retrieved from <http://www.psypress.com/journals/details/0022-3891/>
- Saulsman, L. M., & Page, A. C. (2004). The five-factor model and personality disorder empirical literature: A meta-analytic review. *Clinical Psychology Review*, *23*, 1055-1085. doi:10.1016/j.cpr.2002.09.001
- Savasir, I., & Erol, N. (1989). Yeme tutum testi anoreksiya nervosa belirtileri indeksi. *Turk Psikoloji Dergisi*, *23*, 19-25. Retrieved from <http://www.turkpsikiyatri.com/en/default.aspx?modul=home>
- Schifferstein, H. N. J., & Oude Ophuis, P. A. M. (1998). Health-related determinants of organic food consumption in the Netherlands. *Food Quality Preference*, *9*, 119-133. doi:10.1016/S0950-3203(97)00044-X

- Sebelis, S. (1996). Macrobiotics for everyone. *Journal of the Australian Traditional-Medicine Society*, 2, 6. Retrieved from <http://www.atms.com.au/about-atms/journal/>
- Shapiro, S., Newcomb, M., & Loeb, T. B. (1997). Fear of fat, deregulated-restrained eating, and body-esteem: Prevalence and gender differences among eight-to-ten-year-old children. *Journal of Clinical Child Psychology*, 26, 358-365. Retrieved from <http://www.tandfonline.com/toc/hcap20/current#>.
- Shepherd, R., & Dennison, C. M. (1996). Influences on adolescent food choice. *Proceedings of the Nutrition Society*, 55, 345-357. Retrieved from <http://www.nutrition-society.org/publications/nutrition-society-journals/proceedings-of-the-nutrition-society>
- Slattery, M. L., Jacobs Jr., D. R., Hilner, J. E., Caan, B. J., Van Horn, L., Bragg, C., . . . Liu, K. (1991). Meat consumption and its associations with other diet and health factors in young adults: The CARDIA study. *American Journal of Clinical Nutrition*, 54, 930-935. Retrieved from <http://ajcn.nutrition.org>
- Smith-Spangler, C., Brandeau, M. L., Hunter, G. E., Bavinger, J. C., Pearson, M., Eschbach, P. J., . . . Bravata, D. M. (2012). Are organic foods safer or healthier than conventional alternatives? A systematic review. *Annals of Internal Medicine*, 157, 348-366. Retrieved from [www.annals.org](http://www.annals.org)
- Specker, S., de Zwaan, M., Raymond, N., & Mitchell, J. (1994). Psychopathology in subgroups of obese women with and without binge eating disorder. *Comprehensive Psychiatry*, 35, 185-190. doi:10.1016/0010-440X(94)90190-2

- Spencer, C. (1994). *The heretic's feast: A history of vegetarianism*. London, England: Fourth Estate.
- Spencer, C. (1995). *The heretic's feast: A history of vegetarianism*. Hanover, NH: University Press of New England.
- Spitzer, R. L., Devlin, M., Walsh, B. T., Hasin, D., Wing, R., Marcus, M. D., ... Nonas, C. (1991). Binge eating disorder: To be or not to be in DSM-IV. *International Journal of Eating Disorders*, *10*, 627-629. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-108X](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-108X)
- Spitzer, R. L., Devlin, M., Walsh, R. T., Hasin, D., Wing, R., Marcus, M. D., ... Nonas, C. (1992). Binge eating disorder: A multisite field trial of the diagnostic criteria. *International Journal of Eating Disorders*, *11*, 191-203. doi: 10.1002/1098-108X(199204)11:3<191::AID-EAT2260110302>3.0.CO;2-S
- Spitzer, R. L., Yanovski, S., Wadden, T., Wing, R., Marcus, M. D., Stukard, A., ... Horne, R. L. (1993). Binge eating disorder: Its further validation in a multisite study. *International Journal of Eating Disorders*, *13*, 137-153. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-108X](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-108X)
- Srinivasagam, N. M., Kaye, W. H., Plotnicov, K. H., Greeno, C., Weltzin, T. E., & Rao, R. (1995). Persistent perfectionism, symmetry, and exactness after long-term recovery from anorexia nervosa. *American Journal of Psychiatry*, *152*, 1630-1634. Retrieved from <http://ajp.psychiatryonline.org/journal.aspx?journalid=13>

- Stice, E., Telch, C. F., & Rizvi, S. L. (2000). Development and validation of the eating disorder diagnostic scale: A brief self-report measure of anorexia, bulimia, and binge-eating disorder. *Psychological Assessment, 12*, 123-131. doi:10.1037/1040-3590.12.2.123
- Stiles, B. L. (1998). Vegetarianism: Identity and experience as factors in food selection. *Free Inquiry in Creative Sociology, 26*, 213-225. Retrieved from [http://www.researchgate.net/journal/0736-9182\\_Free\\_inquiry\\_in\\_creative\\_sociology](http://www.researchgate.net/journal/0736-9182_Free_inquiry_in_creative_sociology)
- Striegel-Moore, R. H., Cachelin, F. M., Dohm, F. A., Pike, K. M., Wilfley, D. E., & Fairburn, C. G. (2001). Comparison of binge eating disorder and bulimia nervosa in a community sample. *International Journal of Eating Disorders, 29*, 157-165. doi: 10.1002/1098-108X(200103)29:2<157::AID-EAT1005>3.0.CO;2-8
- Sullivan, V., & Damani, S. (2000). Vegetarianism and eating disorders—Partners in crime? *European Eating Disorders Review, 8*, 263-266. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1099-0968;jsessionid=505110BB5BDF234E065AF752C95097D1.d02t02](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-0968;jsessionid=505110BB5BDF234E065AF752C95097D1.d02t02)
- Tasca, G. A., Demidenko, N., Krysanski, V., Bissada, H., Illing, V., Glick, M., . . . Balfour, L. (2009). Personality dimensions among women with an eating disorder: Towards reconceptualizing DSM. *European Eating Disorders Review, 17*, 281-289. doi:10.1002/erv.938

- Telch, C. F., & Agras, W. S. (1994). Obesity, binge eating and psychopathology: Are they related? *International Journal of Eating Disorders*, *15*, 53-61. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-108X;jsessionid=451CEBEDD0429BF06616024FC5282F04.f04t02](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-108X;jsessionid=451CEBEDD0429BF06616024FC5282F04.f04t02)
- Telch, C. F., & Stice, E. (1998). Psychiatric comorbidity in women with binge eating disorder: Prevalence rates from a non-treatment seeking sample. *Journal of Consulting and Clinical Psychology*, *66*, 768-776. doi:10.1037/0022-006X.66.5.768
- Thompson-Brenner, H., & Westen, D. (2005). Personality subtypes in eating disorders: Validation of a classification in a naturalistic sample. *British Journal of Psychiatry*, *186*, 516-524. doi:10.1192/bjp.186.6.516
- Timimi, S., Douglas, J., Tsiftisopoulou, K. (1997). Selective eaters: A retrospective case note study. *Child Care Health Development*, *23*, 265-278. doi:10.1111/j.1365-2214.1997.tb00968.x
- Tools and Resources*. (2013). Retrieved January 29, 2013, Food Allergy Research and Education website: <http://www.foodallergy.org/facts-and-stats>
- Tu, J. L. (1999). *Is cooked food poison? Looking at the science on raw vs. cooked food*. Retrieved May 3 2013 from <http://www.beyondveg.com/tu-j-l/raw-cooked/raw-cooked-2b.shtml#enzymes>
- How many vegetarians are there?* (2009, May 15). Retrieved July 5, 2013, The Vegetarian Resource Group website: <http://www.vrg.org/press/2009poll.htm>

- Tylka, T. L., & Subich L. M. (1999). Exploring the construct validity of the eating disorder continuum. *Journal of Counseling Psychology, 46*, 268-276.  
doi:10.1037/0022-0167.46.2.268
- Van der Ster Wallin, G., Norring, C., & Holmgren, S. (1994). Selective dieting patterns among anorectics and bulimics at the onset of eating disorder. *European Eating Disorders Review, 2*, 221-232. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1099-0968;jsessionid=505110BB5BDF234E065AF752C95097D1.d02t02](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-0968;jsessionid=505110BB5BDF234E065AF752C95097D1.d02t02)
- Varga, M., & Máté, G. (2009). Eating and body image related problems in orthorexia nervosa. *The 17<sup>th</sup> International Conference on Eating Disorders; 2009 Oct 22-24; Congress Centrum Alpbach, Tirol, Austria*. Abstract book. P. 39.
- Vegetarian Times. (2008). Vegetarianism in America. Retrieved from <http://www.vegetariantimes.com/article/vegetarianism-in-america/>
- Villarejo, C., Fernández-Aranda, F., Jiménez-Murcia, S., Peñas-Lledó, E., Granero, R., Penelo, E., ... Menchón, J. M. (2012). Lifetime obesity in patients with eating disorders: Increasing prevalence, clinical and personality correlates. *Eating Disorders Review, 20*, 250-254. doi:10.1002/erv.2166
- Vitousek, K., & Manke, F. (1994). Personality variables and disorders in anorexia nervosa and bulimia nervosa. *Journal of Abnormal Psychology, 103*, 137-147.  
doi:10.1037/0021-843X.103.1.137
- WebMD (2014). *Allergy statistics and facts*. Retrieved from <http://www.webmd.com/allergies/allergy-statistics>

- Westen, D. (1995). A clinical-empirical model of personality: Life after the Mischelian ice age and the NEO-lithic era. *Journal of Personality, 63*, 495-524. doi:10.1111/1467-6494.ep9510042306
- Westen, D., & Harnden-Fisher, J. (2001). Personality profiles in eating disorders: Rethinking the distinction between axis I and axis II. *American Journal of Psychiatry, 158*, 547-562. Retrieved from <http://ajp.psychiatryonline.org/journal.aspx?journalid=13>
- Wilfley, D. E., Wilson, G. T., & Agras, W. S. (2003). The clinical significance of binge eating disorder. *International Journal of Eating Disorders, 34*, S96-S106. doi:10.1002/eat.10209
- Wilfley, D. E., Zoler Douchis, J., Stein, R., Robinson Welch, R., Friedman, M. A., & Ball, S. A. (2000). Comorbid psychopathology in binge eating disorder: Relation to eating disorder severity at baseline and following treatment. *Journal of Counseling and Clinical Psychology, 68*, 641-649. doi:10.1037/TO22-006X.68.4641
- Willard, B. E. (1997). *What's for dinner? Articulating and antagonizing the American foodway*. (Unpublished doctoral dissertation). University of Iowa.
- Williams, C. M. (2002). Nutritional quality of organic food: Shades of grey or shades of green? *Proceedings of the Nutrition Society, 61*, 19-24. doi:10.1079/PNS2001126
- Williamson, C. S. (2007). Is organic food better for our health? *Nutrition Bulletin, 32*, 104-108. doi:10.1111/j.1467-3010.2007.00628x

- Wilson, A., & Ball, M. (1999). Nutrient intake and iron status of Australian male vegetarians. *European Journal of Clinical Nutrition*, *53*, 189–94. Retrieved from <http://www.nature.com/ejcn/index.html>
- Wilson, G. T., Grilo, C. M., & Vitousek, K. M. (2007). Psychological treatment of eating disorders. *American Psychologist*, *62*, 199-216. doi:10.1037/0003-066X.62.3.199
- Wonderlich, S. A., Crosby, R. D., Joiner, T., Peterson, C. B., Bardone-Cone, A., Klein, M., ... & Vrshek, S. (2005). Personality subtyping and bulimia nervosa: Psychopathological and genetic correlates. *Psychological Medicine*, *35*, 649-657. doi:10.1017/S0033291704004234
- Wonderlich, S. A., Lilienfeld, I. R., Riso, I. P., Engel, S., & Mitchell, J. E. (2005). Personality and anorexia nervosa. *International Journal of Eating Disorders*, *37*, S68-S71. doi:10.1002/eat.20120
- Wonderlich, S. A., & Mitchell, J. E. (2001). The role of personality in the onset of eating disorders and treatment implications. *Psychiatric Clinics of North America*, *24*, 249-258. doi:10.1016/S0193-953X(05)70221-5
- Yanovski, S. Z. (2003). Binge eating disorder and obesity in 2003: Could treating an eating disorder have a positive effect on the obesity epidemic? *International Journal of Eating Disorders*, *34*(Suppl), S117-S120.  
Retrieved from [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098y](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098y)
- Yanovski, S. Z., Nelson, J. E., Dubbert, B. K., & Spitzer, R. L. (1993). Association of binge eating disorder and psychiatric comorbidity in obese subjects. *American*

*Journal of Psychiatry*, 150, 1472-1479. Retrieved from

<http://ajp.psychiatryonline.org/journal.aspx?journalid=13>

Zhu, A. J., & Walsh, B. T. (2002). Pharmacologic treatment of eating disorders.

*Canadian Journal of Psychiatry*, 47, 227-234. Retrieved from <http://ww1.cpa->

[apc.org:8080/Publications/cjpHome.asp](http://apc.org:8080/Publications/cjpHome.asp)

## APPENDICES

APPENDIX A  
CONSENT FORM

1. This research study will examine factors that are related to food attitudes and personality traits. If you agree to participate, you will be asked to answer survey questions about your eating and dietary behaviors, as well as questions about your personality.
2. You are free to discontinue your participation at any time without penalty. You may also skip any survey questions that make you feel uncomfortable. Even if you withdraw from the study, you will receive any entitlements that have been promised to you in exchange for your participation, such as extra credit or entry into a raffle.
3. Participation in this research study does not guarantee any benefits to you. However, possible benefits include the fact that you may learn something about how research studies are conducted and you may learn something about this area of research (i.e., factors that are related to food attitudes and personality traits).
4. You will be given additional information about the study after your participation is complete.
5. If you agree to participate in the study, it will take about 30-45 minutes to complete the survey.
6. All data from this study will be kept from inappropriate disclosure and will be accessible only to the researchers and their faculty advisor. The researchers are not interested in anyone's individual responses, only the average responses of everyone in the study.
7. The present research is designed to reduce the possibility of any negative experiences as a result of participation. Risks to participants are kept to a minimum. However, if your participation in this study causes you any concerns, anxiety, or distress, please contact the Student Counseling Center at (209) 667-3381 to make an appointment to discuss your concerns, or feel free to contact your local mental health center.
8. This research study is being conducted by Deborah Forester. The faculty supervisor is Dr. Lin Myers, Professor, Department of Psychology and Child Development, California State University, Stanislaus. If you have questions or

concerns about your participation in this study, you may contact the researchers through Dr. Myers at (209) 667-3722.

9. You may obtain information about the outcome of the study at the end of the academic year by contacting Dr. Myers.
10. If you have any questions about your rights as a research participant, you may contact the Campus Compliance Officer of California State University Stanislaus at IRBadmin@csustan.edu.
11. You will be provided with a blank, unsigned copy of this consent form at the beginning of the study.
12. By signing below, you attest that you are 18 years old or older.
13. By signing below, you are indicating that you have freely consented to participate in this research study.

PARTICIPANT'S SIGNATURE: \_\_\_\_\_

DATE: \_\_\_\_\_

## APPENDIX B

## DEMOGRAPHICS QUESTIONNAIRE

- 1) Which sex do you identify with?  
 Male     Female     Other \_\_\_\_\_
- 2) What is your age? \_\_\_\_\_
- 3) What is the highest level of education you have completed?
  - a.  Less than High School
  - b.  High School Diploma or GED
  - c.  Some college
  - d.  Two-Year College Degree (AA or AS)
  - e.  Four-Year College Degree (BA or BS)
  - f.  Advanced Degree
- 4) What is your annual household income?
  - a.  Less than \$10,000
  - b.  \$10,000 to \$25,000
  - c.  \$25,000 to \$50,000
  - d.  \$50,000 to \$75,000
  - e.  \$75,000 to \$100,000
  - f.  \$100,000 or more
- 5) Which of the following best describes your current relationship status?
  - a.  Single

- b.  Cohabiting
- c.  Married
- d.  Separated
- e.  Divorced
- f.  Widowed

6) Which of the following best describes your ethnicity?

- a.  Caucasian (White/Non-Hispanic)
- b.  Black/African Heritage
- c.  Hispanic/Latino
- d.  Asian Heritage
- e.  Native American Indian/Alaska Native
- f.  Native Hawaiian/Pacific Islander
- g.  Other \_\_\_\_\_

7) What is your sexual orientation?

- a.  Heterosexual
- b.  Gay Man
- c.  Lesbian Woman
- d.  Bisexual
- e.  Other \_\_\_\_\_

8) In which state or province do you currently reside?

---

9) Have you ever been diagnosed with an eating disorder?

- a.  Yes
- b.  No
- c.  Would rather not say

If you answered “yes”, who diagnosed you?

- a.  Medical Doctor (MD)
- b.  Holistic/Alternative Medicine Practitioner
- c.  Psychologist
- d.  Psychiatrist
- e.  Nutritionist/Registered Dietician
- f.  Other

What was your diagnosis? (Check all that apply)

- Anorexia Nervosa
- Bulimia Nervosa
- Binge Eating Disorder
- Avoidant/Restrictive Feeding Intake Disorder
- Other: Please specify: \_\_\_\_\_

10) Has anyone in your immediate family been diagnosed with an eating disorder?

- a.  Yes
- b.  No
- c.  Would rather not say

If you answered “yes”, which one(s)? (Check all that apply)

Anorexia Nervosa

Bulimia Nervosa

Binge Eating Disorder

Avoidant/Restrictive Feeding Intake Disorder

Other: Please specify \_\_\_\_\_

11) Have you been diagnosed with one or more food allergies?

a.  Yes

b.  No

If you answered “yes”, was the diagnosis made by a medical doctor?

Yes  No

To which food(s) are you allergic?

---



---

We are interested in your food choices that were made for other than losing weight (for health, because of your preference, religious reasons, etc.). Please consider the following questions:

(1) Are you currently following a specific dietary plan (e.g., vegetarian, raw food, etc.) that is for you about food choice?

Yes  No

If you answered “yes”, please identify what dietary plan you presently follow:

Vegetarianism

Which type?

\_\_\_ Vegan (Avoid meat, poultry, fish, eggs, dairy products  
and gelatin)

\_\_\_ Lacto Vegetarian (Avoid meat, poultry, fish and eggs)

\_\_\_ Lacto-Ovo Vegetarian (Avoid meat, poultry and fish)

\_\_\_ Partial Vegetarian (Avoid meat)

\_\_\_ Raw Food Theory

\_\_\_ Macrobiotics

\_\_\_ Paleo

\_\_\_ Other

---

(2) If you are currently following a specific dietary plan, how old were you when you first put this dietary plan in place? \_\_\_\_\_

(3) Are there other dietary plans that you have followed in the past?

\_\_\_ Yes      \_\_\_ No

If you answered “yes”, please identify which plans you have followed, how old you were when you began them, your reasons for following them, and how long you followed them for:

---



---



---



---

Based on your answers, it is possible that the researcher may want to contact you in the future for an interview as part of a continuation of the present study. Please identify below whether or not you wish to be contacted by the researcher:

Yes       No

APPENDIX C  
ORTO-15 EATING SCALE

Instructions:

This questionnaire contains 15 questions. Please read each item carefully and choose the one answer that best corresponds to the likelihood that you would experience the activity.

- | <b>Always</b>  | <b>Often</b> | <b>Sometimes</b> | <b>Never</b> |
|--|--------------|------------------|--------------|
| 1  | 2            | 3                | 4            |
| 1) When eating, do you pay attention to the calories of the food?                      |              |                  | _____        |
| 2) When you go in a food shop, do you feel confused?                                   |              |                  | _____        |
| 3) In the last three 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 health food increases self-esteem?    |              |                  | _____        |
| 11) Do you think that eating healthy food changes your life-style (frequency of eating |              |                  | _____        |

- out, friends, etc.)? \_\_\_\_\_
- 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 D

## THE NEO FIVE-FACTOR INVENTORY-3 (NEO-FFI-3 SCALE)

## Instructions:

Carefully read all of the instructions before beginning. This questionnaire contains 60 statements. Please read each item carefully. For each statement, fill in the circle with the response that best represents your opinion. Make sure that your answer is in the correct box.

Fill in (SD) if you *strongly disagree* or the statement is definitely false.

Fill in (D) if you *disagree* or the statement is mostly false.

Fill in (N) if you are *neutral* on the statement, if you cannot decide, or if the statement is about equally true and false.

Fill in (A) if you *agree* or the statement is mostly true.

Fill in (SA) if you *strongly agree* or the statement is definitely true.

Note that the responses are numbered in *rows*. Fill in only one response for each statement. Respond to all of the statements, making sure that you fill in the correct response.

1. I am not a worrier.
2. I like to have a lot of people around me.
3. I enjoy concentrating on a fantasy or daydream and exploring all its possibilities, letting it grow and develop.
4. I try to be courteous to everyone I meet.
5. I keep my belongings neat and clean.
6. At times I have felt bitter and resentful.
7. I laugh easily.
8. I think it's interesting to learn and develop new hobbies.
9. At times I bully or flatter people into doing what I want them to.
10. I'm pretty good about pacing myself so as to get things done on time.
11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
12. I prefer jobs that let me work alone without being bothered by other people.
13. I am intrigued by the patterns I find in art and nature.

14. Some people think I'm selfish and egotistical.
15. I often come into situations without being fully prepared.
16. I rarely feel lonely or blue.
17. I really enjoy talking to people.
18. I believe letting students hear controversial speakers can only confuse and mislead them.
19. If someone starts a fight, I'm ready to fight back.
20. I try to perform all the tasks assigned to me conscientiously.
21. I often feel tense and jittery.
22. I like to be where the action is.
23. Poetry has little or no effect on me.
24. I'm better than most people, and I know it.
25. I have a clear set of goals and work toward them in an orderly fashion.
26. Sometimes I feel completely worthless.
27. I shy away from crowds of people.
28. I would have difficulty just letting my mind wander without control or guidance.
29. When I've been insulted, I just try to forgive and forget.
30. I waste a lot of time before settling down to work.
31. I rarely feel fearful or anxious.
32. I often feel as if I'm bursting with energy.
33. I seldom notice the moods or feelings that different environments produce.
34. I tend to assume the best about people.
35. I work hard to accomplish my goals.
36. I often get angry at the way people treat me.
37. I am a cheerful, high-spirited person.
38. I experience a wide range of emotions or feelings.
39. Some people think of me as cold and calculating.
40. When I make a commitment, I can always be counted on to follow through.
41. Too often, when things go wrong, I get discouraged and feel like giving up.
42. I don't get much pleasure from chatting with people.
43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
44. I have no sympathy for beggars.
45. Sometimes I'm not as dependable or reliable as I should be.
46. I am seldom sad or depressed.
47. My life is fast-paced.
48. I have little interest in speculating on the nature of the universe or the human condition.
49. I generally try to be thoughtful and considerate.
50. I am a productive person who always gets the job done.

51. I often feel helpless and want someone else to solve my problems.
52. I am a very active person.
53. I have a lot of intellectual curiosity.
54. If I don't like people, I let them know it.
55. I never seem to be able to get organized.
56. At times I have been so ashamed I just wanted to hide.
57. I would rather go my own way than be a leader of others.
58. I often enjoy playing with theories or abstract ideas.
59. If necessary, I am willing to manipulate people to get what I want.
60. I strive for excellence in everything I do.

## APPENDIX E

## DEBRIEFING SHEET

Thank you for participating in this study! Prior research suggests that restrictive behavior around food could be associated with being overly concerned with healthy foods. This type of behavior, when it interferes with a person's ability to function has been termed Orthorexia Nervosa (ON). A person with this type of restrictive food behavior may only eat raw foods, only eat foods grown in a certain radius of their dwelling, may compulsively check the nutritional content of food before it can be consumed, or may consider only certain foods healthy. This type of concern could adversely affect interpersonal or even occupational functioning. In this study we are extending the literature on ON to specifically look at relationships between personality characteristics and these attitudes toward food. In addition, we were interested in whether this eating behavior is more prevalent in certain geographical areas compared to others. All the information we collected in this study will be kept safe from inappropriate disclosure, and there will be no way of identifying your responses in the data archive. We are not interested in anyone's individual responses; rather, we want to look at the general patterns that emerge when all of the participants' responses are put together. We ask that you do not discuss the nature of the study with others who may later participate in it, as this could affect the validity of my research conclusions.

If you have any questions about the study or would like to learn about the results of the study, you may contact me (Deborah Forester) through my research supervisor, Dr. Lin Myers, at (209) 667-3722. If you have questions about your rights as a research participant, you may contact the Campus Compliance Officer of CSU Stanislaus at IRAdmin@csustan.edu. If participation in the study caused you any concern, anxiety, or distress, you may contact the Student Counseling Center at (209) 667-3381 or your local mental health facility.

If you would like to learn more about this research topic, we suggest the following references:

Bratman, S. (1997). *Original essay on Orthorexia*. Available at:  
[[www.orthorexia.com](http://www.orthorexia.com)].

Bratman, S., & Knight, D. (2000). *Health food junkies*. New York, Broadway Books.  
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  
Weight Disorders, 9*, 151-157.