

DEVELOPMENT AND VALIDATION OF AN INVENTORY MEASURING DIETARY  
ATTITUDES OF HEALTHY EATING AND ORTHOREXIA NERVOSA

A Dissertation

by

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This dissertation meets the standards for scope and quality of  
Texas A&M University-Corpus Christi and is hereby approved.

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## ABSTRACT

The obesity epidemic in the United States today has facilitated increased public discussion of healthy eating (Chaki, Pal, & Bandyopadhyay, 2013). Researchers suggest that as eating healthy continues to be emphasized, individuals will become increasingly more aware of how their eating habits impact their overall health, and many will strive to adjust their food choices accordingly (Bosi, Çamur, & Güler, 2007). ). As individuals begin making more health-conscious lifestyle choices, a growing number will develop problems resulting in healthy eating-related pathology, which can severely interfere with daily functioning, resulting in malnutrition, and, in extreme cases, lead to death. Bratman and Knight (2000) initially observed the phenomenon of pathology connected to healthy eating, naming it *orthorexia nervosa* (ON). The intention of this research study will be to explore the epidemiological composition of ON in an American college student sample and to create a valid survey instrument exploring ON as a psychological construct.

With the need for additional research concerning ON, there is a necessity for an instrument exploring ON's latent construct. An instrument exploring cognitive, emotional, and behavioral themes leading to problematic eating can aid health professionals in recognizing possible signs and symptoms of ON. Unhealthy eating habits lead to deteriorations in physical and mental health and may impact an individual's ability to function effectively in daily life (O'Neil, et al., 2014). Therefore, the aim of this research is to develop an instrument designed to identify cognitions, emotions, and behaviors underlying disordered eating pathology related to ON.

## DEDICATION

I am dedicating my work to my parents, who always encouraged me to follow my dreams and taught me to extend the respect, loyalty, and goodwill I received under their care to the people that cross my path through life. They inspired me to ask questions, be curious, and keep on learning and growing. I love you so very much.

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## **SECTION I: CHAPTER I, II, and III**

### **CHAPTER I: Introduction**

Eating disorders are more than a fad, a lifestyle choice, or a phase of life to be easily dismissed. Rather, they represent serious, complex, and potentially life-threatening conditions. The seriousness of these conditions is affirmed by the fact that eating disorders (ED) are included in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth edition* (DSM-5) and characterized by a number of pathological eating behaviors (American Psychiatric Association, 2013). Numerous research studies reflect good nutrition as an important component in promoting mental health and cognitive functioning (O'Neil, et al., 2014; Sacks, Jacka, Birk, & Allender, 2014). Many college students, especially sports, health, and performing arts majors, strive to increase their performance through eating healthy and adhering to a strict dietary regiment. However, these healthy eating behaviors can develop into pathology when healthy eating becomes an obsession (Koven & Abry, 2015).

*Orthorexia Nervosa* (ON) is an obsession with eating healthy, but it was not listed in the draft for the DSM-5. Despite the attention ON received in media and medical communities, many doctors agreed that a separate diagnosis for ON was presently unwarranted. The reasoning for non-inclusion of ON in the DSM-5 was that ON might be related to anxiety disorders or might represent a precursor to a commonly diagnosed mental condition (Rochman, 2010). Another argument for non-inclusion was that the diagnostic criteria, established through ample research data and clinical acceptance, were not sufficiently available for ON at the time the DSM-5 was conceptualized (Rochman, 2010).

The DSM-5 specifies the following eating disorders (EDs): Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED), Avoidant and Restrictive Food Intake

Disorder (ARFID), and Other Specified Feeding or Eating Disorder (OSFED) (American Psychiatric Association, 2013). Anorexia Nervosa is characterized by failure to retain a sufficient body weight, body image disturbance, and an excessive food restriction. Bulimia Nervosa is described as binge eating (consuming unusually large amounts of food), including compensatory behaviors to avoid weight gain. Individuals suffering from BN feel out of control and have a distorted body image. Avoidant and Restrictive Food Intake Disorder is a food avoidance behavior leading to a failure to meet the body's nutritional needs. Other Specified Feeding or Eating Disorder presents with many of the symptoms of the other eating disorders such as AN, BN, or BED, but will not meet the full criteria for a diagnosis of these EDs (American Psychiatric Association, 2013).

According to VandenBos (2007), EDs represent an unhealthy relationship with food that negatively affects an individual's health, emotions, and ability to function in daily life. In addition to the DSM-5 introduction to eating disorders, VandenBos (2007) defined eating disorders as a range of psychological disorders characterized by abnormal or disturbed eating habits, with its onset predominantly in adolescence years. The National Association of Anorexia Nervosa and Associated Disorders (2016) published a study of English-speaking Americans (N = 9,282) examining a range of mental health conditions, including eating disorders, and found that 13.2% of girls surveyed met the criteria for a DSM-5 eating disorder by age 20 (Stice, Marti, Shaw, & Jaconis, 2010). Additional research conducted by Volpe and colleagues indicated that most disordered eating starts in adolescence, a period which can be particularly challenging, considering the numerous emotional and physical changes faced during puberty. Additionally, young adults often experience pressures related to academics, peer socialization, and family



expectations, leaving them vulnerable to developing clinically significant disturbances in eating (Volpe, Tortorella, Manchia, Monteleone, Albert, & Monteleone, 2016).

In a 2007 U.S. population study conducted by Hudson, Hiripi, Pope, and Kessler (2007), the age for the onset of eating disorders was found to be between 18 and 21 years old, the age bracket where most young adults attend college. Over one-half of young adult girls and nearly one-third of young adult boys use unhealthy dietary behaviors (e.g. restricting, skipping meals, fasting, diet pills, and purging) to restrict weight gain (Lampard, et al., 2016). Additionally, the eating disorder Anorexia Nervosa has the highest mortality rate of any mental illness and is associated with a heightened risk of suicide (Eisenberg, Neumark-Sztainer, Story, & Perry, 2005). While longitudinal studies on ON are currently unavailable, researchers have indicated that extreme dietary behaviors can result in medical complications identical to AN, including, but not limited to, bradycardia (extremely slow heartbeat), osteopenia (bone density lower than normal), testosterone deficiency, malnutrition, and anemia (Moroze, Dunn, Holland, Yager, & Weintraub, 2015; Park, et al., 2011).

Therefore, ignoring signs of adolescent and young adult eating disorders can have serious lifelong psychological repercussions. Neumark-Sztainer (2005) stated that the likelihood of a complete recovery depends on discovering the disordered eating behaviors. Many college students engage in these behaviors in secrecy, suggesting that the prevalence rates for EDs might be higher than reported.

### **General Prevalence Rates for Eating Disorders**

Wade, Keski-Rahkonen, and Hudson (2011) and the National Eating Disorder Association (NEDA, 2011) stated that approximately 20 million women and 10 million men will experience a clinically significant eating disorder during their lifetime in the United States alone.

Researchers stated that eating disorders are not only as prevalent as previously suspected but also show high comorbidity with other mental illnesses, such as functional impairment, suicidality, and obsessive-compulsive behaviors (Allen, Byrne, Oddy, & Crosby, 2013; Feldman & Meyer, 2007). Furthermore, Keski-Rahkonen and Mustelin (2016) stated that only one-third of individuals suffering from an eating disorder receive treatment for their ED. In 2011, Eisenberg and colleagues concluded that 3.6% of men had positive screens for an eating disorder, a high prevalence rate for men. This assumption was based on the fact that prevalence rates for men tend to be underscored in assessments predominantly designed to measure eating disorders in females, producing gender-biased outcomes (Darcy, et al., 2015; Eisenberg, Nicklett, Roeder, & Kirz, 2011).

### **Adolescent and Young Adult Prevalence Rates for Eating Disorders**

Lewinsohn, Hops, Roberts, Seeley, and Andrews (1993) studied EDs in young adults and found lifetime prevalence rates of 1.4% per 1,000 males and 2.3% per 1,000 females. Moreover, other researchers reported that up to 20% of young women practice unhealthy patterns of dieting, purging, and binge eating, and about 5% of young women experience an eating disorder (Klump, Bulik, Kaye, Treasure, & Tyson, 2009).

Furthermore, in a study by Allen and colleagues (2013) including 1,383 adolescent and young adults, the reported prevalence of any ED listed in the DSM-5 in males was 1.2% at 14 years, 2.6% at 17 years, and 2.9% at 20 years. Moreover, a study of 2,822 students conducted on a large university campus found that 3.6% of adolescent males had screened positive for an ED (Eisenberg, et al., 2011). In contrast, researchers reported the prevalence rate of ON as high as 80% for some populations (e.g. athletes, dancers, nutritionists, dieticians, and nurses). When

viewed in context of the prevalence rates for AN, BN, and BED, the ON rate seems out of proportion, warranting further exploration of the construct of ON (Bosi, Çamur, & Güler, 2007; Bundros, Clifford, Silliman, & Morris, 2016).

### **Characteristics of ON, AN, and BN**

Mental health professionals are familiar with eating disorders included in the DSM-5 such as anorexia nervosa, bulimia nervosa, and binge eating disorder, yet many have not heard of orthorexia nervosa. Media coverage of orthorexia nervosa on *Good Morning America*, Fox, CNN and ABC news, as well as articles in the *Washington Post*, *New York Times*, and *Time* magazine, led mental health professionals to take notice (Davies, et al., 2012). Defined by Bratman and Knight in 1997, orthorexia nervosa has become a subject of growing academic research over the past two decades (Koven & Abry, 2015). Specifically, researchers have focused primarily on establishing prevalence rates using the Orto-15 assessment and extracting diagnostic criteria based on observation and published literature (Donini, Marsili, Graziani, Imbriale, & Cannella, 2005; Dunn & Bratman, 2016; Fidan, Ertekin, Işıkay, & Kırpınar, 2010; French, 2015; Koven & Abry, 2015; Varga, Thege, Dukay-Szabó, Túry, & van Furth, 2014).

When and how healthy eating turns into a disorder is a valid question, as not everyone adhering to a strictly healthy diet will automatically develop orthorexia nervosa (Brytek-Matera, 2012). Many people following a healthy eating philosophy believe that restrictive dieting addresses certain diseases and provides similar health-improving outcomes to individuals who restrict their diets due to medical reasons (Hesse-Biber, Leavy, Quinn, & Zoino, 2006). Healthy eating has been increasingly emphasized by U.S. media, presenting the majority of information regarding proper health and nutrition for the public and reinforcing the belief that healthy eating will address most health-related issues (Chang, James, & Effron, 2014; Schuldt, Guillory, &

Gay, 2016; Vaughan & Fouts, 2003). Many individuals rely on social media and the Internet for their health information and use what they find to guide their nutritional practices. Often the information found is confusing and contradictory, making everyday health-related choices frustrating and difficult (Graham, Cobb, & Cobb, 2016; Wansink, 2006). Nevertheless, the information displayed in commercials, published on government web pages, and described by websites selling supplements and so-called “wonder cures” determines what the public deems healthy and how we should or should not eat (Stochel, et al., 2015; Wansink, 2006).

This cultural trend towards a healthier lifestyle may encourage increased concerns about the quality and purity of food, particularly for college students aspiring to make healthy food choices to increase their health and cognitive functioning. However, they are presented with contradictory nutritional information, from both the media and the scientific community (Wansink, 2006). The U.S. Food and Drug Administration website, for example, displayed 15 pages of food items recalled due to contamination and unhealthy ingredients during the year 2016 alone, alerting health-concerned individuals to the contaminants found in their foods and making it hard for them to trust their food sources (U.S. Food and Drug Administration, 2016). With increased public concerns about food safety, pesticides, and genetically modified crops and animals, the health-minded individual may steer toward extremes and develop an eating disorder such as ON. Furthermore, other factors that may lead to the development of an ED like ON are the effects of social desirability and social approval, aspiring to perfectionistic views on healthy living and body image, and receiving admiration for one’s effort to meet unrealistic expectations related to food, health, and appearance (Forney & Ward, 2013).

Orthorexia nervosa can be physically dangerous, with symptoms that are serious and chronic in nature, resulting in malnutrition, extreme weight loss, cardiac complications, and

death. Bratman and Knight (2000) coined the term *orthorexia nervosa* after observing clients exhibiting pathological eating patterns, showing extreme concerns about healthy eating, and maintaining the purity of their body to achieve optimum health. The term *orthorexia nervosa* originated from the Greek word *ortho*, meaning right or correct, and the word *orexis*, meaning appetite or desire (Stochel, et al., 2015). Its pathological pattern differentiates ON from currently recognized eating disorders specified in the DSM-5 (American Psychiatric Association, 2013) and warrants increased examination in its own right.

ON is often diagnosed as anorexia nervosa (AN), or obsessive-compulsive disorder (OCD), due to its overlapping symptomatology (see Figure 1). However, there are significant differences between ON and AN in the motivation for disordered eating. Individuals suffering from AN and ON tend to be overly preoccupied with their dietary intake and practice elaborate food-related rituals, yet there are major differences between the two EDs. For example, individuals suffering from ON are more likely to display a sense of superiority based on adherence to their diet, flaunting their eating habits or rituals rather than expending considerable effort on secrecy (Bratman & Knight, 2000). An explanation of the distinctions between ED pathologies follows (see Figure 1).

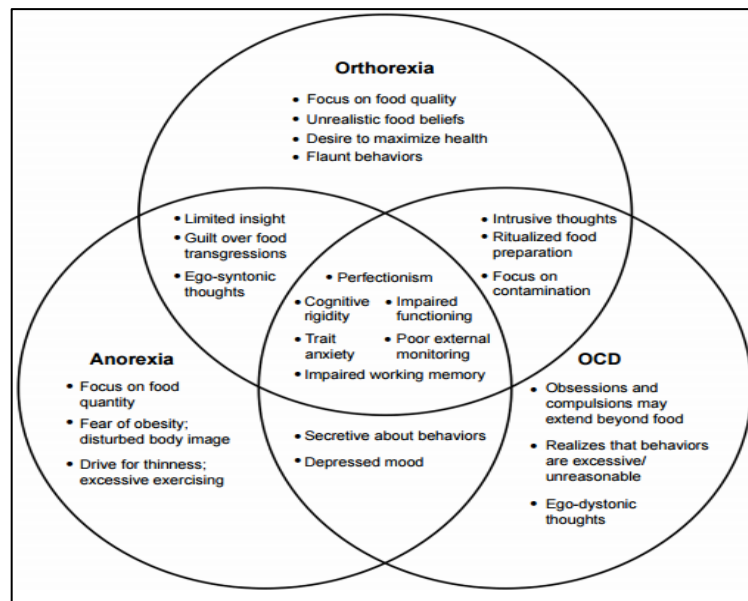


Figure 1. Co-occurring Symptomatology of ON, AN, and OCD. Reproduced with permission from Koven & Abry, (2015)

**Orthorexia Nervosa.** Orthorexia Nervosa is characterized by an obsessive fixation and desire to eat exclusively healthy foods, leading to the avoidance of entire food groups. Individuals suffering from ON will isolate from others and experience a sense of superiority when comparing themselves to individuals who may consume foods the individual with orthorexia deems unhealthy and rejects (Brytek-Matera, 2012). Ramacciotti and colleagues stated that ON is perpetuated by the entrenched drive to restrict food intake to the few foods considered to be pure and healthy enough for consumption (Ramacciotti, et al., 2002).

**Anorexia Nervosa.** Individuals suffering from AN exhibit obsessive fear of being overweight and will engage in voluntary starvation, purging, excessive exercising, or other measures to control weight. Researchers found that individuals with AN restrict food to increase their sense of control over their lives. They often have a negative or distorted body image, believing they are overweight even when they are dangerously thin (Eisenberg, et al., 2011).

**Bulimia Nervosa.** Individuals suffering from BN are often a normal weight and height, but exhibit a distorted body image, thinking that they are too fat. These distorted cognitions often

lead the individual with bulimia to binge and purge in secrecy, leading to mixed feelings of shame and relief after purging (Wade, et al., 2011). Individuals suffering from BN are less concerned about the type of food they eat, and their behavior is rather an attempt to feel in control over a life that seems out of control. Clients suffering from BN reported feelings of self-hatred, guilt, and the need to control at least this aspect of their lives (American Psychiatric Association, 2015).

**Differences between ON, AN, and BN.** In AN and BN, cultural pressures, faulty thinking about food intake, the desire to control, distorted body perception, and a tendency toward perfectionism are the motivational factors for engaging in unhealthy eating behaviors (American Psychiatric Association, 2013). Additionally, researchers speculate that there are some genetic factors compounded by learned social motivators which place some individuals at higher risk for developing an eating disorder (Frieling, et al., 2010). Essentially, individuals with AN, BN, and BED tend to be overly concerned with body image and weight, but not with the purity or health benefits associated with their food.

In contrast, individuals suffering from ON become obsessed with the quality and ritual of food preparation, strictly adhering to their rules regarding the ingredients of meals. Any deviation from the presumed healthy and superior diet evokes a guilty conscience and high anxiety (Bratman, & Knight, 2000; Stochel, et al., 2015). Individuals suffering from ON tend to drastically reduce their options for acceptable foods out of fear of contaminants such as pesticides, artificial colors, preservatives, and any ingredients considered unhealthy. They experience feelings of guilt and loathing when deviating from their strict dietary guidelines and will spend the majority of their time thinking about food and planning meals for the following days (Dunn & Bratman, 2016). Food becomes the central focal point in their lives at the expense

of social relationships, hobbies, and activities; the nutritional value of the food takes precedence over the taste of food and the enjoyment of eating. Individuals with orthorexia often become highly agitated and extremely anxious when they cannot adhere to their self-imposed preset dietary requirements. The high anxiety experienced motivates the individual to engage in obsessive behaviors in an attempt to provide temporary relief. Such obsession is evidenced by the perceived necessity to avoid food bought or prepared by others. Consequently, it leads individuals to distance themselves from friends and family, driven by the fear that eating anywhere but at home will make it impossible to abide by their diet (Dunn & Bratman, 2016).

Additionally, individuals with ON experience feelings of satisfaction, inflated self-esteem, superiority over others, and spiritual fulfillment from restricting their food choices to what they deem eating healthy (Dunn, & Bratman, 2016; Eriksson, Baigi, Marklund, & Lindgren, 2008). Moreover, individuals suffering from ON feel superior and judgmental towards anyone who does not adhere to such high standards of healthy eating habits. While individuals with BN and AN exert great effort to keep their dietary habits secret, individuals suffering from orthorexia flaunt their dietary habit as superior (Alvarenga, et al., 2012).

Despite what seems to be an easily recognizable set of pathological behaviors, Vandereycken (2011) noted that the lack of clear-cut diagnostic criteria for orthorexia nervosa proves problematic to clinicians attempting to help clients address these specific eating concerns. As a result, he proposed a list of possible criteria for future integration into the next DSM; yet without clearly defined diagnostic criteria, developing psychometrically sound assessments for orthorexia nervosa seems daunting. The two main assessments used in research on ON are the Eating Attitudes Test (EAT-26) and the Orto-15. The EAT-26 is a self-administered test used to determine general dysfunctional eating habits. It does not focus on any specific eating disorder,



nor was it designed for diagnostic purposes (Williams, Hand, & Tarnopolsky, 1982).

Furthermore, the EAT-26 was described as an unsatisfactory instrument for evaluating the risk factors associated with developing an eating disorder that deviates from BN or AN (Rodríguez, Salar, Carretero, Gimeno, & Collado, 2015). Garner and colleagues, the creators of the EAT-26, utilized the diagnostic criteria for AN and BN to formulate the questions; therefore, the instrument becomes less reliable when the symptomatology differs, as in ON (Garner, Olmsted, Bohr, & Garfinkel, 1982).

In contrast, Bratman and Knight's (2000) Orto-15 was conceptualized utilizing long-term observations of their clients' unique pathology and was specifically designed to recognize pathology in individuals thought to be suffering from ON. The Orto-15 was adapted and revised for use outside the United States and is currently the main instrument utilized for assessing ON. Bratman himself criticized the instrument for capturing individuals simply concerned with food quality or following a vegan or vegetarian diet, as these individuals lack the magnitude of symptomatology associated with ON (personal communication, 2015). Evidence-based research and epidemiological information are very limited concerning ON. With ON initially being coined by US researchers, it is surprising to discover that the majority of research on the subject has been conducted internationally (Aksoydan & Camci, 2009; Alvarenga, et al., 2012; Arusoğlu, Kabakci, Köksal, & Merdol, 2008; Bosi, Çamur, & Güler, 2007; Brytek-Matera, 2012; Chaki, et al., 2013; Fidan, et al., 2010). Varga and colleagues (2014) concluded that no incidence studies were available due to a lack of valid diagnostic criteria for ON. However, the media reports it as a novel eating disorder likely to receive increased national attention.

## **Statement of the Problem**

With the rising prevalence of eating disorders and a noticeable shift towards healthy living and healthy food choices, particularly on college campuses, exploring ON can provide mental health and healthcare professionals with a useful tool to gauge when healthy eating becomes unhealthy (Allen, et al., 2013). With further research needed and professionals continuing to deliberate about the inclusion of ON into the next DSM, a more specific instrument for extrapolating themes and factors of the construct of ON is needed.

Stochel and colleagues (2015) argued that there are not any sufficient instruments to assess ON, which may be due to the lack of diagnostic criteria and lack of research exploring how distinctive ON is from current eating disorders recognized in the DSM-5 (American Psychiatric Association, 2013; Donini, et al., 2005; Rodríguez, et al., 2015). There is a need to expand the current knowledge base related to the factors surrounding ON, to strengthen and revise diagnostic criteria, and to develop an effective risk/diagnostic assessment for ON.

With ON having similar symptomatology as AN, BN, and obsessive-compulsive disorder (OCD; see Figure 1), clinicians tend to predominantly diagnose ON as one of these disorders and approach treatment accordingly, a practice that might not be effective considering the differences in the underlying etiology of pathology. Therefore, there is a lack of services available on college campuses tailored to individuals suffering from ON.

The Burda-Orthorexia Risk Assessment (B-ORA) is designed to address this gap by providing additional knowledge surrounding orthorexia nervosa in a college environment. The B-ORA has the potential to provide additional data to clinicians and college campus health services, allowing for specialized treatment modalities to be developed. Moreover, the B-ORA may provide additional data that may help define ON diagnostic criteria and address the fact that

the criteria for the purported disorder are still hypothetical and abstract. Providing additional instruments for the exploration of ON may enable researchers in the United States to address the scarcity of research conducted with domestic populations. Providing a tool for optimized exploration will allow for a more comprehensive understanding of ON prevalence rates, psychological risk factors, and comorbid psychopathologic symptomatology, as well as a method for indexing intervention effectiveness.

### **Purpose of the Study**

The purpose of this research is to utilize current proposed diagnostic criteria and literature concerning ON to create a survey instrument exploring participants' behaviors, emotions, and thoughts surrounding their dietary habits. The research will aid in the creation of a psychometrically sound screening tool that can be used in clinical work with clients who may be exhibiting signs of this potentially new eating disorder, ON.

The intention of this assessment is to provide additional data that clinicians may use to understand the underlying motivation of students with ON tendencies in a college environment. The B-ORA might prove useful in identifying individuals exhibiting pathological preoccupations with healthy eating and add to the currently limited research about ON.

### **Research Questions**

The study aims to answer the following four research questions:

- (1) What are the underlying factors/dimensions of the B-ORA instrument?
- (2) What is the internal consistency reliability of the B-ORA with a sample of college students?
- (3) To what extent do scores on the B-ORA correlate with scores on the EAT-26 and Orto-15?

(4) What is the degree of validity associated with the internal structure of the B-ORA?

### **Significance of the Study**

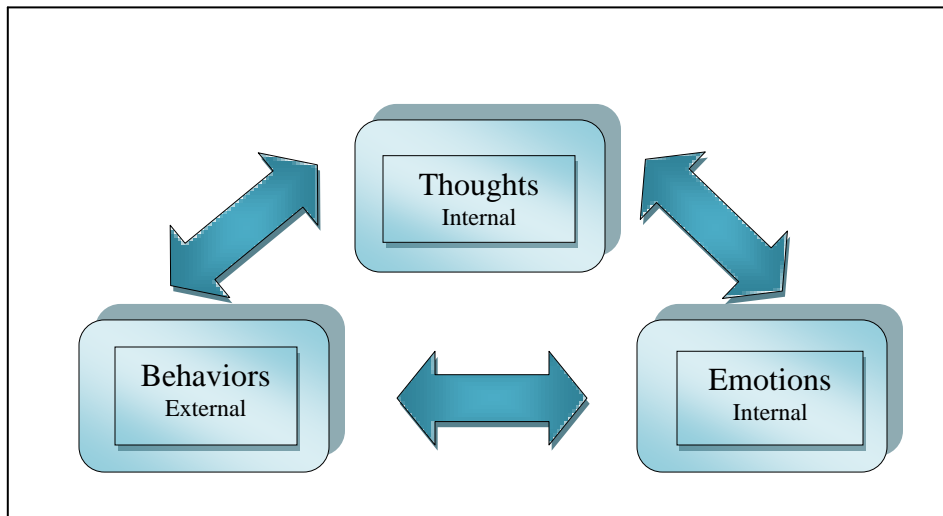
This research will aid in the creation of a psychometrically sound screening tool that can be used in clinical work with clients who may be exhibiting signs of this potentially new eating disorder. The findings of this study will benefit health practitioners and student services personnel by helping them to recognize pathology in individuals who may be exhibiting signs and symptoms consistent with the currently proposed diagnostic criteria for ON. The data gathered from this study could be used to further validate or revise the proposed diagnostic criteria for ON. Devising a data collection tool such as the B-ORA can facilitate further exploration and identification of the themes related to problem behavior in individuals concerned with healthy dieting.

Additionally, the B-ORA could provide clinicians with supplementary information useful for working with their clients and providing a way to begin dietary exploration. Furthermore, the assessment may provide additional indicators to facilitate a better understanding of ON and how ON differs from other eating disorders, providing clinicians and student services personnel with additional information to address ON related symptomatology. Individuals experiencing disordered eating behaviors like ON may benefit from the administration and subsequent discussion of the results of the B-ORA by gaining further insight into their relationship with food and also their emotions, thoughts, and behaviors surrounding food, and, therefore, may become purposefully invested in change. The utilization of the B-ORA may facilitate future research about ON, expressly aiding in the understanding of the discriminability between ON, AN, and OCD and illuminating exclusive aspects of disordered eating psychopathology associated with

ON. The development of the B-ORA may provide future directions for additional assessments of this construct and may provide increased clarity about the nature of the ON construct.

### **Conceptual Framework**

Researchers proposed that eating disorders are caused by a complex interaction of genetic, biological, psychological, and social factors. Individuals who conduct research about eating disorders explore the behaviors, thoughts, emotions, genetics, and brain functioning of affected individuals to better comprehend risk factors and identify biological markers to conceptualize more specific modalities targeting areas in the brain that control eating behavior (Ahmed, et al., 2016). New technologies, especially brain imaging research, may provide more specific clues about how individuals respond to specific treatments. Orthorexia nervosa showed co-occurring symptomatology with AN, BN, and OCD in the areas of compulsive behaviors, irrational thoughts, and emotional triggers, resulting in unhealthy eating habits (see Figure 2). A nutritionally savvy individual might cognitively know which diets are healthy and which are not, yet still make poor decisions when presented with challenges based on emotional patterns. Compulsive eaters might comprehend nutritional aspects but be unaware that their emotions and thoughts affect their food choices. The thought-emotion-behavior connection associated with ON suggests that the interaction between thoughts and emotional aspects triggers the behavior that may lead to the obsessive dietetic restrictions found in individuals displaying ON symptomatology (Shanwal & Dasgupta, 2014).



*Figure 2. CBT-Reciprocal Interaction of Thoughts, Behaviors, and Emotions. Adopted from Boettcher, Hofmann, & Wu, 2013.*

The pattern of thoughts, emotions, and behaviors motivating individuals with ON tendencies provided the basis for the initial design of the instrument (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). Collecting data by observing behaviors will provide only limited insight into the functioning of ON, with the internal motivations for engaging in the observed behavior remaining hidden or latent. These latent variables can be explored by collecting data through self-reported measures from individuals engaging in some or all of the behaviors currently associated with ON. Even data collected from individuals not engaging in any ED or ON pathology will provide valuable information on the differences between individuals with ED or ON tendencies and healthy individuals. Increasing our understanding of the reciprocal nature of cognitive, emotional, and behavioral factors that sustain EDs and ON may promote the development of additional new treatment targets (Kass, Kolko, & Wilfley, 2013).

## **Definition of Key Terms**

**Eating Disorder (ED):** Any of a range of psychological disorders characterized by abnormal or disturbed eating habits (VandenBos, 2007).

**Healthy Diet:** A diet that includes high amounts of fruits and vegetables, raw foods, whole grains, fish and nuts and excludes high amounts of salt, pepper, sugar, coffee and other caffeinated beverages, red meat, fatty foods and alcohol (Marcovitch, 2015; Branscum & Sharma, 2014).

**Health:** A state of complete physical, mental, and social well-being, not simply just the absence of disease; generally characterized by abstaining from smoking, drug and alcohol usage, regular physical activity, and a healthy diet (World Health Organization citation).

**Healthy Living:** includes the steps, actions, and strategies implemented to achieve optimum health (Chiuve, McCullough, Sacks, & Rimm, 2006).

**Orthorexia Nervosa (ON):** Healthy eating behavior that becomes extreme, obsessive, psychologically limiting, and sometimes physically dangerous due to an unhealthy obsessional preoccupation with pure and healthy eating (Dunn & Bratman, 2016).

## **CHAPTER II: Literature Review**

### **Societal Impact on Food Consumption Patterns**

Many aspects of the American food culture develop in unison with political, scientific, and socio-cultural development throughout the history of the United States (Turner, 2014). This connection becomes evident when exploring the historical background of the food culture in the US and its parallel changes over time. Throughout the decades, the mass media has popularized a multitude of special diets purported to promise quick and effective results in weight management and to achieve optimum health benefits, such as the Pritiken diet of the 1980s and the Atkins

low-carb and Mediterranean diets of the 1990s (Byrd-Bredbenner & Grasso, 2000; Roberts, 2016; Wallach, 2014). By the turn of the millennium, Americans were introduced to the South Beach diet and the MIND diet in 2016, aimed at increasing overall health, managing weight, and fighting new health risks associated with obesity and heart disease. Partially due to the obesity epidemic in the US, a new social trend emerged centering around healthy eating and healthy lifestyles (Chaki, et al., 2013). Today our culture contains constant messages about gluten-free, paleo, and organic diets and leads us to question GMOs (genetically modified organisms) and antibiotics in our meat and dairy products. The messages we receive as a society are confusing, contradicting, and ever changing, adding to the general confusion about what constitutes a healthy diet and healthy lifestyle (Smith, 2013; Turner, 2014; Williams, 2016). Individuals concerned with the purity of their foods can easily maneuver to extremes, reducing the types of food items they consume to what they believe is safe and contaminant-free. When this restriction poses health risks such as malnutrition, physical illness, and psychological distress, an eating disorder, such as ON, may occur (Chaki, et al., 2013).

### **Eating Disorders**

The term *eating disorder* was defined by the American Psychological Association (APA) Dictionary of Psychology as any range of psychological disorders characterized by abnormal or disturbed eating habits (VandenBos, 2007). The DSM-5 states that “feeding and eating disorders are characterized by a persistent disturbance of eating or eating-related behavior that results in the altered consumption or absorption of food and that significantly impairs physical health or psychosocial functioning” (APA, 2013, p. 329).

Abnormal or disturbed eating habits are defined and diagnosed according to the criteria outlined in the most current version of the DSM. However, eating disorders have numerous



features in common and clients often move between them (Fairburn & Harrison, 2003; Welch, et al., 2016). Eating disorders are mental illnesses causing physical and psychosocial morbidity; they occur predominantly in young adult girls and young adult women and are less frequently reported by men (Keski-Rahkonen & Mustelin, 2016). According to Wade and colleagues, approximately 20 million women and 10 million men will experience a clinically significant eating disorder throughout their lifetime in the United States alone (Wade, et al., 2011). Frieling and colleagues found a genetic predisposition and some specific environmental risk factors that contributed to the development of an eating disorder, suggesting that unhealthy and destructive patterns of eating and managing weight may be transmitted across generations (Frieling, et al., 2010).

Patton and Viner (2007) documented the results of a British national survey study on the early-onset of EDs and stated that the overall prevalence rate was 3.01 cases per 100,000, of which 19% did not report any body image issues or any fear of gaining weight. Kolar, Chams, and Mejia Rodriguez (2016) conducted eating disorder studies in Latin America and found that out of ten samples ( $n = 10,365$ ), the mean prevalence rate for AN was 0.1%. Out of seven samples ( $n = 9,391$ ), they found the mean prevalence rate for BED to be 4.3%, and out of 13 samples ( $n = 14,341$ ), they found the mean prevalence rate for BN to be 1.28%. Kolar and colleagues (2016) concluded that the mean prevalence rates for AN were lower for individuals in Latin America than in western countries, while the mean prevalence rate for BED was remarkably higher than in the US and Europe, and about the same for BN. Mohler-Kuo, Schnyder, Dermota, Wei, and Milos (2016) conducted a cross-sectional household survey study with computer-assisted telephone interviews in Switzerland ( $n = 10,038$ ) and found a lifetime prevalence rate for all EDs of 3.5%. For AN, BN, and BED, the lifetime prevalence rates for

females were 1.2%, 2.4%, and 2.4% respectively, while the lifetime prevalence rates among men were 0.2%, 0.9%, and 0.7%. Furthermore, the researchers stated that out of the individuals meeting DSM-5 criteria for any ED, only 49.4% of males and 67.9% of females had ever sought professional help concerning their eating problems. Nagl and colleagues conducted a longitudinal community study in Germany ( $n = 3,021$ ) exploring the prevalence of AN and BN in individuals ranging from 14 to 24 years of age. Three rounds of assessment over the course of 10 years revealed a lifetime prevalence rate for EDs of 2.9% for women and 0.1 % among men (Nagl, et al., 2016).

Welch and colleagues stated that in 2016, the lifetime prevalence rate for BED was 1.9 % for adults, with the onset of the eating disorder occurring between the late teenage years and early twenties. Furthermore, they stated that the projected estimated lifetime prevalence of BED for the US population will reach approximately 2.03% in 2016 (Welch et al., 2016). In 2011, Eisenberg and colleagues found that 3.6% of males had positive screens for an eating disorder and concluded that the female-to-male ratio was 3:1. Recently, researchers stated that the prevalence figures for men tend to be underscored, as assessments were predominantly designed to measure eating disorders in females, and, additionally, males tend to underreport suffering from an ED. (Darcy, et al., 2015).

Moreover, researchers reported a higher prevalence of eating disorders than previously suspected and indicated a high comorbidity with other mental health disorders (Allen, et al., 2013; Feldman & Meyer, 2007). Keski-Rahkonen and Mustelin (2016) stated that approximately 70% of individuals suffering from EDs reported co-occurring mental disorders: anxiety disorders above 50%, mood disorders above 40%, self-harm above 20%, and substance abuse above 10%.

Furthermore, he stated that adolescence and young adult suicide risk is elevated due to body dissatisfaction resulting in increased risk of developing an ED.

## **Diagnosis**

It is essential for clinicians to identify the presence of eating disorders due to their negative mental and physical impact, especially considering AN and its high mortality rate. It is central to provide differential diagnoses using the DSM-5, but clinicians should also assess eating behaviors by asking questions, as these disorders often occur in secrecy and may remain unnoticed for years. In addition to asking routinely about eating behaviors, clinicians can conduct risk assessments that can provide an integral component for diagnosis (Eichen & Wilfley, 2016). In contrast, ON behaviors are flaunted, perceived as more socially acceptable, and disguised as the notion of striving to improve health (Brytek-Matera, Rogoza, Gramaglia, & Zeppegno, 2015). This may result in challenges associated with clients recognizing that a problem may exist.

Individuals at high risk for developing ON reported feelings of shame and guilt after deviating from their healthy diets 8.8% of the time (Bosi, et al., 2007). Furthermore, they experienced a high fear response concerning contaminated or unhealthy foods 4.6% of the time, avoided eating with others 2.5% of the time, and ate only self-prepared foods 1.1% of the time (Bosi, et al., 2007).

Orthorexia nervosa has comorbid features with AN and OCD, which are functionally similar in clinical presentations, stimulating debate as to whether ON is a unique disorder or a subset of AN or OCD. The main differentiating characteristics of ON are the rigid preparation of meals; the excessive time spent researching and categorizing food; the obsession with healthy, pure foods; and planning every detail of future meals (Koven & Abry, 2015). Brytek-Matera and colleagues found that eating-related pathology was not a predictor for individuals developing

orthorexic behaviors and that the existing differences between ON and other eating disorders constitute the need for specific treatment approaches (Brytek-Matera, et al., 2015).

## **Treatment**

The majority of research into the treatment of eating disorders has focused on bulimia nervosa and evidence-based management aspects of the disorder. Fairburn and colleagues posed an interesting viewpoint, stating that the real problem concerning EDs is associated less with the symptoms of dieting, bingeing, or purging, and more with culturally and socially reinforced unhealthy attitudes and beliefs regarding a person's shape and weight. They recommend a modular approach utilizing cognitive behavioral therapy, psychotherapy, interpersonal therapy, and family-based therapy and medications for the treatment of eating disorders (Fairburn, Cooper, Shafran, & Wilson, 2008). Limitations in current treatment-related research include a lack of consistent efficacy, the paucity of data, and the need for eating disorder-type tailored approaches (Peterson, Becker, Treasure, Shafran, & Bryant-Waugh, 2016).

Concerning ON, research data on therapeutic outcomes and current best practices are sparse, suggesting that ON may be successfully treated with a combination of cognitive behavioral therapy and psychoeducation. Optimized assessment will not only permit a clearer understanding of prevalence rates, psychosocial risk factors, and comorbid psychopathology but will also allow the indexing of intervention efficacy (Koven & Abry, 2015).

## **Eating Disorders on College Campuses**

Unhealthy dietary choices and behaviors leading to disordered eating are prevalent among college students and are often the result of coping with the increased stress of attending college (Bundros, et al., 2016). The onset of disordered eating happens predominantly in the age bracket associated with adolescence and young adulthood (e.g., 10 to 21 years of age), where approximately 68.4 % of young adults start college immediately following high school.

According to a study by Kass and colleagues, EDs are a severe health problem affecting 9% of college students that often emerges during the time when individuals attend college (Kass, et al., 2017; Stice, Marti, & Rohde, 2013; Volpe, et al., 2016).

A study by Jones and colleagues explored the prevalence rates of EDs on two U.S. college campuses and found that 0.7% of students screened positive for AN, 4.7% screened positive for all other EDs excluding AN, 31.8% of students were found to be at high risk for developing an ED, and 62.9% of students were found at low risk for developing an ED (Jones, et al., 2014). By the Fall semester of 2015, 20.2 million adolescent and young adults were expected to attend colleges and universities, constituting an increase of 5.2 million since the year 2000. The projected enrollments in U.S. degree-granting institutions from 2012 to 2022 estimated that there were 22 million college students in 2016 in the USA and that 75% were dissatisfied with their weight (U.S. Department of Education, 2016). Entering college right after graduation from high school demarks a significant change in lifestyle and environmental circumstances that may result in mental health pathology. Researchers suggested that the severity and prevalence rates of mental health issues among college students continue to rise (Watkins, Hunt, & Eisenberg, 2012). A total of 497 counseling center directors completed the 2015 Association of University and College Counseling Center Directories (AUCCCD) survey exploring the mental health of college students (Reetz, Barr, & Krylowicz, 2014; see Figure 3). Anxiety and depression are among the top mental health issues experienced by college populations. Eating disorders among college students seem low in comparison at around 7 %, yet disordered eating behaviors are known to be a primary coping mechanism used by students to reduce stress, depression, and anxiety (see Table 1). Researchers documented that high stress affected eating behavior and food

intake rituals in western countries, particularly in college environments, increasing the risk of developing an ED (Hou, et al., 2013).

Table 1.

*College Students Attending Counseling and Presenting Concern in Percentage*

	Mean	Median
Anxiety	47.34	47
Depression	40.13	40
Relationship Issues	32.48	30
Alcohol abuse/dependence	10.58	10
Substance abuse/dependence	7.66	5
Eating Disorders	7.00	5

(Reetz et al., 2014)

Attending college is a significant transition for many high school students and includes adjusting to new living environments, developing new social groups, and forming new relationships. This new environment is saturated with academic challenges, newfound freedom to make one's own schedule, a multitude of opportunities for substance use, and the beginning of a period of exploration (Patton & Viner, 2007; Ross, Niebling, & Heckert, 1999). Moreover, entering college after high school includes separation from the young adults' family and social support systems, which may cause them to experience high levels of stress. Additionally, adolescence is marked by neuroendocrine changes (hormonal), increasing the stress response intensity causing emotional, physical, and psychological changes and making them a population at increased risk for behavioral and emotional issues (Patton & Viner, 2007; Romeo, 2013; Ross, et al., 1999).

Researchers from Germany, Poland, and Bulgaria conducted cross-sectional surveys and found an association between higher perceived stress levels and higher prevalence of eating

disorders (Mikolajczyk, El Ansari, & Maxwell, 2009). Unhealthy eating habits often occur in response to negative emotions or stress, serving as a form of maladaptive coping providing temporary emotional relief. Nine percent of male college students reported disordered eating; female undergraduates suffering from eating disorders stated that they utilized higher emotion-oriented distraction and coping strategies in comparison with their female undergraduate counterparts without eating disorders (O'Dea & Abraham, 2002; Thome & Espelage, 2004).

In a research study exploring the connection between stress, anxiety, and puberty in elevating the risk of developing an ED, researchers found that the risk of bulimia increases with high anxiety and the onset of puberty, while anorexia risk increases only with high degrees of anxiety (García, Peresmitre, Ariza, Acevedo, & Vizcarra, 2014). North American researchers found that approximately 4% to 13% of students experience symptoms of bulimia nervosa; additionally, 9.6% of the students reported binge-eating episodes. A study conducted at a university in Spain revealed a 19.5% prevalence rate for eating disorders overall on campus; AN was not reported due to insignificant percentages within college populations (Martínez-González, et al., 2013). In contrast, a UK research study estimated the prevalence of EDs at 4.4%, with the prevalence of binge eating disorder at 3.6 %, and the prevalence of bulimia nervosa at 0.8% in general inner-city populations (Solmi, Hotopf, Hatch, Treasure, & Micali, 2016).

In a Portuguese study on eating disorders and related behaviors on college campuses, researchers revealed that approximately 91% of female college students reported that they attempted to manage their weight through dieting (Ribeiro, Conceição, Vaz, & Machado, 2014). The National Association of Anorexia Nervosa and Associated Disorders (2016) reported that 16% of transgender college students reported an eating disorder. Bulimia nervosa was estimated

to affect 2.2% of all college women, and 9.6% of college students reported binge eating episodes. The prevalence rates of binge eating disorder in other countries ranged from .4% to 3.7% in college students (Ribeiro, et al., 2014). The prevalence rates of ON in general and specifically on college campuses vary greatly and are unusually high.

### **Orthorexia Nervosa**

Researchers who explored the prevalence of ON in particular populations reported unusually high rates, which might be due to inadequate measurement instruments, a lack of scientific understanding of the concept of ON, or the fact that its origins were rooted in observations (Bratman, & Knight, 2000; Stochel, et al., 2015). The term *orthorexia nervosa* was coined by Bratman and Knight (2000) after they observed a pathological cluster of symptoms in clients exhibiting extreme concerns about healthy eating and the purity of their food and bodies in order to achieve optimum health. Bratman was a specialist in alternative medicine who worked together with a cook, a holistic medical professional, and an organic farmer to explore and conceptualize his observations of extreme eating habits. The pathology observed included an individual's obsession with healthy eating to the point where the behavior resulted in malnutrition and interfered with daily functioning. The term *orthorexia* was derived from the Greek *orthos*, meaning right or correct, and *orexis*, meaning appetite or hunger (Moroze, et al., 2015).

A literature review by Varga and colleagues found a total of 18 references in PubMed concerning orthorexia nervosa, five related articles on Medline, a single book chapter written by Schwain, and one book, written by Bratman and Knight (2000). The main areas discussed in the material revolved around general information introducing orthorexia nervosa as a concept, and some case studies exploring risk factors and risk groups. A single study investigated co-



occurring symptomatology of ON and AN, and two articles discussed the validation of the Orto-15 instrument measuring ON. A recent article addressed how well orthorexia nervosa was known among professionals who specialized in treating eating disorders, while the remaining articles were summaries and reviews on the symptoms of ON (Varga, et al., 2014). In the first quarter of 2017, research concerning ON had steadily increased although most of the research was conducted internationally rather than in the US (Brytek-Matera, et al., 2015). As of January 2017, there were 47 published articles in PubMed, 70% of which were published in the last five years, a significant increase since 2014.

Publications of studies outside the US originated in Hungary, Germany, Spain, Turkey, Australia, and Sweden; these studies either mentioned ON without a particular research focus or discussed validation of the Orto-15 assessment instrument for their populations (Arusoğlu, et al., 2008; De Souza, & Rodrigues, 2014; Missbach, et al., 2015; Oberle, Samaghabadi, & Hughes, 2017; Sánchez & Rial, 2005; Stochel, et al., 2015). The original Orto-15 does not have sufficient psychometric properties with a Cronbach's alpha of .30 (Missbach, et al., 2015).

The prevalence of ON was reported as high as 80%, which constitutes an alarming rate. These prevalence rates do not correlate with our current understanding of eating disorders, which affect about 2% of the general population (Smink, Van Hoeken, & Hoek, 2012). Some researchers argue that the psychometric properties of the utilized assessments produced high false positives by identifying individuals that solely subscribe to a healthy lifestyle without the presence of an eating disorder. The flaw with the existing instruments in assessing ON seems to be their inability to differentiate whether thoughts, emotions, and behaviors are pathological; these concerns are compounded by the fact that there are currently no guidelines for assessing ON (Dunn & Bratman, 2016). Additional information is needed to facilitate the creation of an

instrument that can successfully delineate between healthy eating and pathology associated with ON. Therefore, collecting and assessing data exploring the latent factors of ON is the next essential step towards creating better functioning orthorexia assessment.

Researchers who explored the prevalence of ON in particular populations using the Orto-15 or its derivative (Table 4) reported unusually high rates, such as 86% for yoga practitioners, 88.7% for nutrition students, and 81.9% for dieticians (Alvarenga, et al., 2012; de Souza & Rodrigues, 2014; Valera, Ruiz, Valdespino, & Visioli, 2014). In a Turkish study utilizing the Orto-15, a prevalence rate of 45.5% was reported, while a study by Aksoydan and Camci (2009) indicated the prevalence of ON as high as 36.4% for symphony orchestra musicians, 81.8% for opera singers, 32.1% for ballet dancers, and 56.4% for performance artists. Fidan and colleagues (2010) reported ON prevalence for medical students was 43.6%, and Ramacciotti and colleagues (2002) found the prevalence of ON within the general population to be as high as 57.6%. A review of the literature concerning ON in college students revealed some peer-reviewed articles specific to ON, mainly assessing the prevalence rates of ON derived from administration of the Orto-15 and the Düsseldorf Orthorexia Skala (DOS) on European campuses. The DOS was constructed by Barthels, Meyer, and Pietrowsky (2015) using item and factor analyses from an online sample ( $N = 1,340$ ), and its psychometric properties of Cronbach's  $\alpha$  ( $= .84$ ) and the retest reliability ( $r = .79$ ) seem adequate.

Rudolph and colleagues identified 2.5 % prevalence rates across a total sample of university students ( $N = 759$ ) who were active members of the university fitness center. In this study, the researchers utilized the DOS, which was derived from the ORTO-9-GE (see Table 2). The researchers found that the active female members had a prevalence rate of 5.1% while the active male members' rates were considerably lower at 1.8%. However, the effect size reported

for this investigation was low ( $d = 0.03$ ), indicating insufficient magnitude of the effect (Rudolph, Göring, Jetzke, & Großarth, 2017).

Malmborg, Bremander, Olsson, and Bergman (2017) compared the health status, the physical activity, and the rates of ON between students enrolled in a business major ( $n = 89$ ) and students enrolled in a sports major ( $n = 118$ ). Out of the total 188 students, 144, or 76.6 %, scored above the cutoff value of the Orto-15, indicating a sufficient score for the existence of ON, with the sports students representing 84.5 % and the business students representing 65.4 %. ON was reported for 45.1% of the male sports students and was lowest at 8.3% for the business female students.

Korinth, Schiess, and Westenhoefer (2009) conducted a study using a group of German university students who studied nutrition ( $n = 219$ , 195 female,  $M$  age range = 22.5 to 25.7) and found that there were no statistically significant differences in ON symptomatology between the students studying nutrition and students in other degree plans. An Australian study by Kinzl and colleagues investigated the prevalence rates of ON in dieticians ( $n = 283$ ,  $M$  age = 36.2 years) and found that 52.3 % displayed ON symptomatology, while 34.9 % displayed ON-specific behaviors and 12.8 % fit their description of having ON (Kinzl, Hauer, Traweger, & Kiefer, 2006). A study by Bundros and colleagues examined the prevalence of ON using the ORTO-15 with a convenience sample of 448 predominately female (79 %) college students, determining a prevalence of 81 %, a prevalence rate higher than the rate found in previous studies (Bundros, et al., 2016). Turkish studies reported estimates of ON to be 43.6 % among medical students (Fidan, et al., 2010) and 45% among resident medical students, with no significant differences between genders (Bosi, et al., 2007). Furthermore, their findings indicated that 45.5 % of medical students were considered to exhibit ON behaviors surrounding their eating habits.

Another Turkish study looking at the prevalence of ON in medical students found a similar rate of symptoms for this population. In a group of 878 students (359 female, *M* age range = 21.3 years), a total of 43.6 % of medical students were considered to have ON symptoms (Fidan, et al., 2010). The authors argue that there may be many reasons that ON may be high in this particular population, including feeling compelled to be a healthy role model for others and having a high level of education about nutrition and healthy lifestyles.

Lynch, Hayes, Napolitano, and Hufnagel (2016) examined 10 public universities, with the largest student bodies having an average of 41,122 undergraduate enrollments.

Table 2.

*Instruments Assessing Orthorexia Nervosa (Derived from the Orto-15)*

Study	New measure name	Summary
Arusoğlu, Kabakci, Köksal, & Merdol (2008)	ORTO-11	The ORTO-15 was translated into Turkish using a complex, multistep method and administered to 994 members of a university. After confirmatory factor analysis only 11 of the 15 items from the ORTO-15 were needed to identify ON. Reliability (Cronbach's alpha = .62)
Varga, Thege, Dukay-Szabó, Túry, and van Furth (2014)	ORTO-11-Hu	These authors translated the ORTO-15 into Hungarian using a complicated, multistep procedure. The translated ORTO-15 was administered to 810 university students. Confirmatory factor analysis revealed, a shortened instrument was adequate to identify ON. Reliability (Cronbach's $\alpha$ = 0.82), (internal validity coefficient of 0.62)
Missbach et al. (2015)	ORTO-9-GE	The ORTO-15 was translated into German using a complicated multistep method and administered to 1029 individuals. Following confirmatory factor analysis, the model with the best fit was a nine item instrument. (Cronbach's alpha = 0.67)

Table 2.

*Instruments Assessing Orthorexia Nervosa (Derived from the Orto-15) continued*

Study	New measure name	Summary
Brytek-Matera, Krupa, Poggiogalle, and Donini (2014)	Polish ORTO-15	They translated the ORTO-15 from English to Polish using a complicated, multistep method. The remaining items were administered to 400 members of a university population. After exploratory and confirmatory factor analyses, only nine items were “distinguished as valid” for use in the Polish version. (Cronbach’s alpha = .64)

### **Possible Orthorexia Nervosa Co-Variate Characteristics in Individuals**

Various studies explored individual participant demographics for possible risk factors in developing orthorexia nervosa. The demographics predominantly considered were:

1. Socioeconomic status.
2. Age.
3. Gender.
4. Education and occupation.
5. Body Mass Index (BMI).

These demographics were chosen due to their consideration in many of the studies concerned with currently recognized EDs as possible predictors or risk factors and might therefore be of interest in the development of a future ON assessment (Aksoydan & Camci, 2009; Bosi et al., 2007; Donini, et al., 2005; Fidan, et al., 2010; Rudolph, et al., 2017; Varga, Dukay-Szabo, & Tury, 2013).

### **Socioeconomic Status**

Socioeconomic status (SES) was not found to be a predictive factor for the increased risk of developing ON (Fidan, et al., 2010). Poor diet quality in some socioeconomic groups was found to be a result of traditional eating habits and food availability rather than a matter of

income (Fidan, et al., 2010). Researchers exploring demographic factors and their correlation to ON found that education, profession, SES, and internalized societal ideals signify factors in the development of ON and argue that gender, age, and BMI are not determining factors in that respect (Varga, Dukay-Szabo, & Tury, 2013).

### **Age**

In a Turkish ON research study, age was found not to be of consequence in the development of ON. The exceptions to this discovery were medical students, with ON tendencies being higher for students below the age of 21 (Aksoydan & Camci, 2009). However, the research study by Donini and colleagues (2005) found a higher risk with the increasing age of individuals in developing ON. Fidan and colleagues (2010) found that the prevalence rate for ON was higher for students 21 years old or younger in contrast to their older peers, while Bosi and colleagues (2007) were unsuccessful in finding a significant relationship between age and ON. Given these contradictory results, the present research study may provide additional data for future conclusions about the prevalence of ON in different age groups.

### **Gender**

There are inconclusive results regarding the impact of gender and its influence on increased risk of developing ON. Some studies found higher prevalence rates in women, while others found the prevalence to be higher in men (Donini, et al., 2005; Fidan, et al., 2010; Varga, et al., 2014). Regardless of gender, ON tendencies were related to the individual's internalized sociocultural attitude regarding the importance of physical appearance. The intensity of ON symptoms was of greater magnitude in fitness-oriented women who demonstrated high concern with meeting sociocultural health ideals, causing increased social anxiety (Eriksson, et al., 2008). Three studies found statistically significant differences by gender, with men identified as more

likely to disclose ON symptomatology than women (Aksoydan & Camci, 2009; Donini, et al., 2005; Fidan, et al., 2010).

### **Education and Occupation**

Educational and occupational factors also demonstrated inconsistent impacts on orthorexia pathology, with some researchers proclaiming higher ON tendencies for less educated populations than populations with post-graduate education (Donini, et al., 2005). Aksoydan and Camci (2009) reported a conflicting trend, stating that the educational and occupational level for individuals and their parents were independent of the tendency of developing ON. Bosi and colleagues (2007) noted similar results to the findings, noting higher levels of education were correlated with a smaller number of ON symptoms. Furthermore, they stated that nutrition students evidenced an increased risk for developing ON due to the stronger focus on healthy eating, and their superior knowledge of the nutritional aspects of various foods (Bosi, et al., 2007; Freitas, Oliveira, Correia, Pinhão, & Poínhos, 2017). Further data collection will be needed to explore this correlation in more detail.

### **Body Mass Index**

Most research indicates that body mass index (BMI) does not influence one's risk for developing ON (Aksoydan & Camci, 2009; Arusoğlu, et al., 2008; Fidan, et al., 2010; Varga, et al., 2014). Some demographic variables have been frequently linked to disordered eating, one of which is BMI. However, although some researchers found a correlation between higher BMI scores and attempts to become healthier through dieting and attending to nutrition, other researchers found BMI insignificant to the development of ON (Arusoğlu, et al., 2008). Oberle and colleagues studied 459 psychology students (80.8% women, 19.2% men) with ages ranging from 16 to 48 years ( $M = 19.85$ ,  $SD = 2.79$ ) and found that high BMI was linked with increased ON symptomatology for men, and that narcissism and perfectionism were linked with increased

ON symptomatology for both women and men (Oberle, et al., 2017). Some studies found that increased ON symptoms corresponded to a higher BMI (Fidan, et al., 2010) while other studies found no statistically significant correlations (Aksoydan & Camci, 2009; Donini, et al., 2005; Ramacciotti, et al., 2002; Varga, et al., 2014). The dissonance in the research findings surrounding ON might be due to the lack of research based on an agreed upon operationalized understanding of ON, indicating the necessity for an instrument exploring ON's latent construct. The following chapter delineates the study design and methodology.

### **CHAPTER III: Methodology**

After attaining permission from the Institutional Review Board's (IRB) of Texas A&M University-Corpus Christi to conduct the research, the instruments used in the study were posted on the Qualtrics online survey research platform. The survey included screening questions, demographic questions, the B-ORA, the EAT-26, and the Orto-15. Prior to participation, participants were presented with the consent form, which included the study objective, exclusion and inclusion criteria, the rights of the participants, anonymity of their identity, the study being voluntary, and the monetary incentive offered for participation.

The researcher designed the study to develop a survey instrument for understanding the factors which motivate individuals to engage in ON-related behaviors and thought processes. The Burda-Orthorexia Risk Assessment (B-ORA) addresses the need for additional fact-finding by promoting increased comprehension and conceptualization of ON that may help to bridge the gap in current U.S. research. The B-ORA is intended to provide clinicians with information needed to identify unhealthy eating habits and the presence of phobic-obsessive personality traits associated with ON.



## **Participants and Sample**

Potential participants included students from any four-year degree-granting institution across the entire US. The inclusion criteria for participating in this study were current enrollment at a four-year degree-granting institution, a minimum age of 18, and the ability to provide consent for participation in the research study. The survey response rate was 18%; about 7,500 invitations were sent out, 1324 respondents entered and started the survey. Of those 1,324, about 824 either screened out of the survey on a screening question or dropped out of the survey and did not submit a response. The survey invitation was a generic invitation to participate providing an anonymous hyperlink that took the respondent to the survey and mentioned the incentive offered. There was a total of 589 participants in the study, which were randomly divided into two groups, one for the initial factor analysis ( $n = 360$ ,  $f = 214$ ;  $m = 141$ ), and the other for the Confirmatory Factor Analysis ( $n = 229$ ,  $f = 146$ ;  $m = 80$ ). The participants' ages ranged from 18 to 72 years with a median age of 23.16 ( $SD = .27$ ).

## **Instruments**

The B-ORA Instrument was developed for use by counselors, dietitians, nutritionists, and physicians when exploring healthy eating related symptomatology and nutritional concerns with their patients and clients. The instrument was designed to be self-administered, with the least amount of questions included to sufficiently capture the measured construct, thus, improving efficiency and minimizing the length of the instrument as possible barriers to completion. The purpose of the survey instrument is to explore participants' behaviors, emotions, and thoughts surrounding their dietary habits and the underlying motivations driving their behaviors. The data gathered from this study will provide clinicians and student services personnel additional information useful in exploring possible eating disorder-related symptomatology while providing

individuals with a better understanding of their dietary habits. The data was gathered from a nonclinical sample providing information on nonpathological eating, which provided a baseline from which the spectrum of disordered eating could be estimated. The development of the instrument had seven discrete steps:

1. Conceptualization of the purpose.
2. Function, and design of the assessment.
3. Congregation of the initial item consortium.
4. Administration of the instrument to experts and general public to determine the quality of the question pool.
5. Exploratory factor analysis (EFA) to design a preliminary version of the instrument;
6. Confirmatory factor analysis (CFA) to validate the initial structure.
7. Assessment of the reliability and validity of the instrument that emerged.

### **Conceptualization of the Purpose, Function, and Design of the B-ORA**

The purpose of this research was to utilize current proposed diagnostic criteria and literature concerning orthorexia nervosa to create a survey instrument exploring participants' behaviors, emotions, and thoughts surrounding their dietary habits. The intention behind developing the B-ORA was to provide researchers with additional data that could be utilized in the development of a diagnostic instrument for ON. Furthermore, the data collected could address ON-related symptomatology and provide the individuals being assessed with additional insight into their dietary habits.

The researcher's aim in this study was to answer the following questions:

1. What are the underlying factors and dimensions of the B-ORA instrument?
2. What is the internal consistency reliability of the B-ORA with a sample of college students?
3. To what extent do scores on the B-ORA correlate with scores the EAT-26 and Orto-15

4. What is the degree of validity associated with the internal structure of the B-ORA?

### **Congregation of the Initial Item Consortium**

The initial questions were compiled from current research findings on self-reported thoughts, emotions, and behavior aspects surrounding healthy eating, including noticeable pathology and related symptomatology of ON. Available research studies and the proposed diagnostic criteria developed by Dunn and Bratman (2016) and Moroze, et al. (2015) were used as a reference in phrasing some of the questions (see Appendix A). Beyond these resources, other suitable items were created using current literature on eating disorders in general and ON specifically (Brytek-Matera, 2012; Bundros, et al., 2016; Moroze, et al., 2015).

The B-ORA utilizes a Likert-type response format (Likert, 1931). Participants responded to each item in the questionnaire using a 4-point scale with the following response options: (1) *I strongly disagree*, (2) *I somewhat disagree*, (3) *I somewhat agree*, and (4) *I strongly agree*. The Likert scale was recommended by Weems and Onwuegbuzie (2001) because it gives ample, yet concrete, choices along a spectrum rather than using a *yes* or *no* answer scheme. This scoring style enables the researcher to capture finer nuances of the measured construct. Additionally, the commonly used midpoint categories such as *I don't know* or *undecided* were avoided to produce higher data accuracy and forgo participant indecisiveness (Weems & Onwuegbuzie, 2001). Moreover, the B-ORA was designed to include reverse coded or negatively worded items that serve as cognitive stop signs for participants to provide a more controlled response and avoid automatic engagement; the reverse coded items are not added to the final score (Chen, Rendina, & Dedrick, 2007; Sauro & Lewis, 2011).

## **Administration of the Instrument to Experts and General Public**

**Determine the quality of the Question Pool.** A group of eating disorder experts performed an initial evaluation of the items included in the draft conceptualization of the instrument. The expert panel consisted of four members: two nutritionists, a counselor, and a leading scholar in the field of eating disorders, which included work with orthorexia. Furthermore, the B-ORA was presented to six laypeople to review grammar, flow, comprehension, and overall feel and look of the survey and its items. Each review participant received an email with an attached document and a link to the survey to provide a streamlined method for obtaining feedback and comments. A preset form was used to enable the review team to compare participants' feedback systematically. The evaluation team, which consisted of the researcher and her dissertation chair, thoroughly cross-checked items receiving comments, determined which reviewers had similar suggestions, and subsequently edited items based on feedback received. Questions the experts identified as inadequately addressing the operationalized concept of ON were edited, and items perceived as being redundant were eliminated. Finally, those items which received the majority of unfavorable evaluations from lay reviewers were crosschecked with the experts' edits to determine whether items were better suited for a rewrite or elimination. Fifteen questions were edited, four questions were completely reworded, four questions were deleted, and two new questions were added based on the suggestions provided by the expert reviewers.

Reference instruments related to eating disorders were selected based on their relevance to the subject being studied, validity and reliability, frequency of appearance in the counseling literature, use in related research studies, and ease of utility. The two assessments chosen were

the Orto-15 and the EAT-26. These instruments were utilized to cross-validate the B-ORA instrument, as both instruments were developed for U.S. populations.

### **Scoring and Interpreting the B-ORA, Orto-15, and EAT-26**

Individuals who evidence low scores on the Orto-15 and high scores on the EAT-26 demonstrate an increased risk for disordered eating behaviors; similarly, a lower score on the B-ORA indicates a higher susceptibility towards disordered eating behaviors and the increased presence of maladaptive thoughts and emotions surrounding an individual's dietary habits. As scoring of the instruments is similar, an individual receiving a low score on the B-ORA should also receive low scores on the Orto-15 and elevated scores on the EAT-26 (see Table 4).

**Orto-15.** The Orto-15 is a 15-item self-administered assessment screening for ON pathology (see Appendix B) and was conceptualized by Bratman and Knight (2000) after decades of observations of clients with disordered eating. The Orto-15 was adapted and revised for use outside the United States and is currently the main instrument utilized specifically for addressing Orthorexia Nervosa. The instrument has been criticized by its developer Dr. Bratman himself (personal communication, 2015) and in other research studies (Bundros, et al., 2016; Missbach, et al., 2015; Stochel, et al., 2015; Varga, et al., 2013) for producing exceptionally high prevalence rates by capturing individuals simply concerned with food quality or following a vegan or vegetarian diet, but lacking the magnitude of symptomatology where healthy eating becomes dysfunctional. Still, it remains the top choice for research studies conducted on ON. The Orto-15 or a derivative were utilized in each study exploring the prevalence rates of ON based on non-validated diagnostic criteria, making the development of a new assessment instrument imperative (Alvarenga, et al., 2012; Arusoğlu, et al., 2008; Bosi, et al., 2007; Donini, et al., 2005; Fidan, et al., 2010; Missbach, et al., 2015; Stochel, et al., 2015; Valera, et. al., 2014).

Cronbach’s alpha for the original version of the Orto-15 is .30 as reported by Missbach and colleagues in 2015. There was no literature addressing the unusual scoring for questions one and thirteen of the Orto-15 (see Table 3). Donini and colleagues (2005) evaluated the predictive ability to diagnose ON by calculating the efficacy, sensitivity, and specificity, as well as the positive and negative predictive value of the Orto-15.

Table 3.

<i>Scoring for the Orto-15</i>				
Items	Responses			
	Always	Often	Sometimes	Never
2 – 5 – 8 – 9	4	3	2	1
3-4-6-7-10-11-12-14-15	1	2	3	4
1-13	2	4	3	1

**EAT-26.** The EAT-26 is a self-administered 26-item instrument utilizing a 6-point Likert-style response format (see Appendix F). This assessment is widely used and has been validated to assess for various risks connected to a variety of disordered eating behaviors and cognitions, including obsessive behavior surrounding dietary habits (Forney & Ward, 2013; Juarascio, et al., 2011; Levitt, 2008; Paulson & Rutledge, 2014). The EAT-26 has been compared to variations of the Orto-15 in most research conducted on ON. The EAT-26 was described as an unsatisfactory instrument in evaluating the risk factors for developing an eating disorder that deviates in behaviors associated with Bulimia Nervosa or Anorexia Nervosa (Rodríguez, et al., 2015). In contrast, the Orto-15 was conceptualized by Bratman and Knight (2000), utilizing long-term observations of Bratman’s clients’ unique pathology and specifically designed to

recognize ON pathology in individuals he thought to be suffering from Orthorexia Nervosa. Las Hayas and colleagues (2006) stated the EAT-26's Cronbach's alpha was 0.79.

Establishing Validity of the BOR-A. The total score of the Orto-15 and the EAT-26 were used in establishing convergent validity, where lower total scores of the Orto-15 and higher total scores of the EAT-26 indicated a stronger tendency towards disordered eating.

Table 4.

<i>Cut-off Values for the Orto-15 / EAT-26</i>		
Instrument	Interpretation	Cut-off Scores
Orto-15	Presents of Orthorexia Nervosa	< 40
EAT-26	Risk of an eating disorder (unspecified)	> 20

Lower scores on the Orto-15 indicate higher ON tendencies, while higher scores on the EAT-26 indicate higher tendencies for disordered eating.

### Procedure

A sample of convenience using undergraduate volunteers was obtained by visiting lectures with faculty permission in order to recruit students for the research project. Faculty e-mail addresses were obtained by visiting each college department's web page, and emails were sent to obtain permission to enter the classroom. The researcher specified that she would need to use approximately 10-15 minutes of lecture time to provide students with the information needed to participate in this research study. Additional research participants were obtained from faculty members who chose to distribute a prepared "Invitation to Participate in Research" e-mail to their students; faculty members were also given the option to post the link to the survey on their electronic course shell. The "Invitation to Participate in Research" e-mail included an anonymized link to the survey to provide students a method of easy, secure access.

The researcher offered an incentive for participation in the form of eight \$50.00 Visa gift cards to be distributed via a drawing held when the data collection process ended. Individuals interested in participating in the drawing for a gift card had the opportunity to enter their e-mails at the end of the survey. Participation in the drawing was voluntary. E-mails were stored separately by the online survey software and were erased once gift card recipients had been determined. A research grant awarded by the Texas Counseling Association provided the funds to purchase the gift cards. Furthermore, additional college students were recruited by purchasing their participation through Qualtrics ( $n = 511$ ). Qualtrics participants are recruited from various sources, including website intercept recruitment, member referrals, targeted email lists, gaming sites, customer loyalty web portals, permission-based networks, and social media and are compensated by the corporation.

The researcher's contact information was provided in the online consent form (Appendix G) and at the beginning of the classroom recruitment. No personal identifying information was collected during the study. If the target number of participants would not be sufficient, the recruitment continued the following semester until the target sample size number was reached ( $n_{\min} = 500$ ).

### **Data Analysis**

This research project received approval from the Institutional Review Board prior to its implementation (Appendix H). The researcher utilized a correlational research design to assess the covariation between naturally-occurring variables without introducing manipulation, providing efficient means in capturing participants' cognitions, behaviors, and emotions surrounding ON (Campbell & Stanley, 2015). The following section contains information about (a) the analysis methods utilized, (b) determining the data's feasibility for factor analysis, (c)



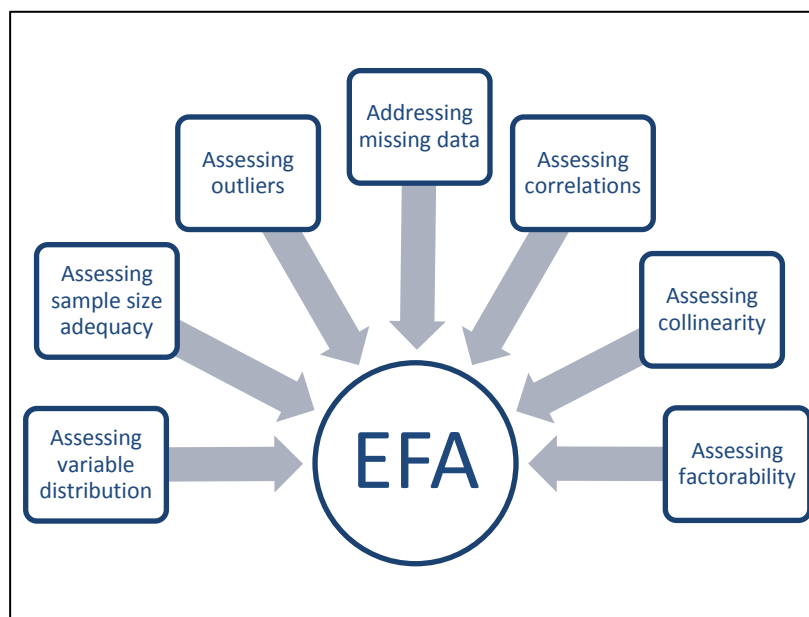
meeting the needed assumptions for factor analysis, (d) exploratory factor analysis, (e) confirmatory factor analysis, and (f) validity and reliability.

### Data Analysis Method

The instrument, the B-ORA, was designed to explore thoughts, emotions, and behaviors associated with the risk of developing ON. The B-ORA collects information on participants' demographics and their behaviors, emotions, and thoughts, which may be indicative of ON. To measure such latent constructs, an Exploratory Factor Analysis (EFA) was utilized (Field, 2013). In this research study, EFA was used as a theory-generating procedure, and confirmatory factor analysis (CFA) was used as a theory-validation procedure.

### Preliminary Analysis

Before conducting the EFA descriptive and exploratory statistics, the researcher analysed the raw data to determine the appropriateness of the chosen statistical method (see Figure 3).



*Figure 3.* Components of the Preliminary Data Analysis Prior to EFA.

**Assessing Variable Distribution.** The Shapiro-Wilks statistic in SPSS was used to determine the normality of the data (Field, 2013). The Box's M statistic tested for homogeneity

of variance (Box, 1949; Box, 1954), which is a statistical test of bivariate correlations.

Furthermore, the graphical methods used for testing the univariate normality were the histograms and the box-and-whisker plot. Each of these methods was used to determine data distribution. In general, EFA is considered a robust test even in the event that data is not normally distributed (Tabachnick & Fidell, 2013). Furthermore, SPSS will provide adjusted values in the event that the data is not normally distributed and also provided means for data transformation to address non-normality if necessary.

**Assessing Sample Size Adequacy.** The prevalent rule-of-thumb in performing an EFA analyses suggests a subject-to-item ratio of 10:1 for determining an a priori sample size (Osborne & Costello, 2009). A research literature analysis by Osborne and Costello (2009) exploring the most commonly used sample size ratios for EFA found that the highest percentage of research studies utilized a 5:1 ratio. Furthermore, Izquierdo, Olea, and José Abad (2014) argued that a large sample size is less important than the proportion of variances explained by the common factors, the correlation among factors, and the number of variables that define each factor. Mundfrom, Shaw, and Ke (2005) recommended a sample size of 200 as sufficient if communalities are  $> 0.5$  and each factor has approximately seven variables. In their research, Mundfrom and colleagues found that the higher the number of variables measured per factor, the higher the level of communality. Moreover, if the communalities are low, a large sample size will not produce a better estimation of the factor loadings. With the B-ORA having a total of 63 questions, the chosen minimum a priori sample size was determined to be  $> 300$  participants.

**Assessing Missing Data.** Missing data and outliers negatively impact the statistical analysis and therefore must be accounted for (Field, 2013). As a rule of thumb, if less than 5% of the data have missing values, the missing data entries will be deleted. However, if more than 5%

of the data are missing, deletion would result in a reduced sample size and increased standard error of the parameter estimates; in such cases, the series mean substitution method would be utilized to replace the missing data (Allison, 2001).

**Assessing Outliers.** To determine which data points qualify as outliers, Tabachnick and Fidell (2013) suggested that an outlier is considered an extreme value if it is at least 1.5 interquartile ranges below the first quartile, or at least 1.5 interquartile ranges above the third quartile of the distribution. Additionally, outliers were identified using the box-plot generated by SPSS, providing a visual representation of the interquartile ranges and the specific data points populating them. Any data point above or below the marked end of the whisker, representing the maximum greatest value of the dataset, is considered an outlier (Field, 2013). Furthermore, the box-plot provided an exploratory graphic representation of the distribution of the dataset, including its skew. Moreover, removing outliers in correlational research increases correlational accuracy in the representation of the known population correlation, and the incidence of errors inference in most cases is lower using a cleaned data set compared to an uncleaned data set (Osborne & Overbay, 2004).

**Assessing Correlations and Multicollinearity.** The survey items were slightly correlated, as they all pertained to the measurement of the same latent construct; however, they should not be too highly correlated, as this would be an indication that multicollinearity exists (Field, 2013). In IBM's SPSS, the intercorrelation was checked using the SPSS correlation matrix and by ensuring the determinant of the correlation matrix is greater than 0.00001. The determinant is used to assess that the matrix is not an identity matrix (Field, 2013).

**Assessing Factorability.** The researcher used the Kaiser-Meyer-Olkin (KMO) test, which measures the sampling adequacy for each item in the survey and the survey as a whole, to

determine how suited the collected data was for EFA. The KMO statistic measures the proportion of the variance between the items that might be shared; a lower proportion indicates a higher suitability of the data for factor analysis (Kaiser, 1960). The KMO will be the main determinant for the data's suitability for EFA, especially if the data is not normally distributed. Cerny and Kaiser (1977) proposed an interpretation of the KMO statistics, which produces values ranging from 0 to 1, as specified in Table 5.

Table 5.

*Kaiser–Meyer–Olkin (KMO): Measure of Sampling Adequacy*

0.00 to 0.49 unacceptable	0.70 to 0.79 middling
0.60 to 0.69 mediocre	0.80 to 0.89 meritorious
0.50 to 0.59 miserable	0.90 to 1.00 marvelous

(Kaiser, 1960)

Once the factorability of the data was established, the data set was explored for collinearity.

### **Exploratory Factor Analysis**

The EFA consists of four distinctive steps:

1. Preliminary analysis.
2. Factor loadings.
3. Factor extraction.
4. Factor rotation.

Part of the function of EFA is to eliminate redundant and correlated questions and to extract the items best representing the construct to be measured (Walker & Madden, 2013).

Exploratory factor analysis (EFA) assists in identifying a smaller number of linear combinations from within the original data variables. This ensures that the instrument captures or accounts for as much of the variability in these correlations as possible. Thus the question pool consists of

items addressing participants' thoughts, emotions, and behaviors surrounding dietary habits, which were developed considering the proposed diagnostic criteria (see Appendix A) and available literature regarding orthorexia nervosa. In EFA, all measured variables are related to the latent variable to be measured.

**Factor Extraction.** In EFA, variables are grouped together by their ability to capture a particular construct or factor. The latent variables, called factors, are exploratory in nature, and no distinction is made involving independent and dependent variables. The exploratory factor analysis was completed on 63 items, utilizing principal axis factoring, which finds the least number of factors that can account for the common variance. Before beginning the interpretation of the results, the output was explored for cross-loadings, meaning an item could have a .32 loading onto more than one factor (Tabachnick & Fidell, 2013). The rationale becomes clearer when calculating  $R^2$ , revealing the amount of variance an item explains in proportion to the total variance of the factor it loaded on ( $0.32^2 = 10\%$ ). Cross-loading items and loadings below or at the .32 cutoff are considered unreliable items as related to the measured construct, explaining less than 10% of variance, and were deleted. Both initial eigenvalues and rotated eigenvalues were examined and taken into consideration during the factor extraction process (Field, 2013).

**Factor Rotation.** The pattern matrix provided in the axis-factoring output of rotated factor loadings was used to interpret possible dimensions further. SPSS offers two oblique rotation algorithms, direct oblimin, and Promax, where Dimitrov (2012) stated direct oblimin was one of the most utilized rotation methods associated with EFA research studies when the researcher expects data correlation, as was the case in the present study. When selecting the oblique rotation method in SPSS, the result produced three-factor matrices: the factor pattern matrix, the factor structure matrix, and the factor correlation matrix.

The oblique rotation allowed for correlations of factors, as the dimensions of ON should have aspects of inherited correlation. Considering the correlation between items, an oblique (direct oblimin) rotation of the pattern matrix provided the factor/item loadings, while the factor correlation matrix revealed the correlation between the factors. The oblique rotation allowed for correlations of factors, as the dimensions of ON should have aspects of inherited correlation. Considering the correlation between items, an oblique (direct oblimin) rotation of the pattern matrix provided the factor/item loadings, while the factor correlation matrix revealed the correlation between the factors (Field, 2013; Osborne & Costello, 2009). The factors or latent variables that emerged addressed common themes. Therefore, orthogonal rotation would result in a possible loss of information due to the expected correlation between factors (Osborne & Costello, 2009).

**Factor Loadings.** In EFA, items should show high values (e.g., factor loadings) on the factor best measuring the latent construct and low-to-no value if it does not. Items loading high, or above .32 on more than one factor (cross-loading), were dropped, while loadings below .32 were ignored. The correlation matrix was examined, and any correlations above .8 were categorized as an insufficient indicator of a factor. Field (2013) suggested using the more stringent cut-off values from 0.32 (poor), 0.45 (fair), 0.55 (good), 0.63 (very good), or 0.71 (excellent). The squared factor loadings correspond to the percentage of variance each item contributes to the factor on which it loaded. Pett, Lackey, and Sullivan (2003) suggested retainable factors should have no less than three variables loaded, and Mvududu and Sink (2013) suggested at least four items per factor was reasonable. The researcher chose to use Mvududu and Sink's (2013) suggestion of four items per factor, which assisted in the subjective naming of

the retained factors. Following the naming of the factors, the emerged theory was tested using Confirmatory Factor Analysis (CFA).

### **Confirmatory Factor Analysis**

In EFA, all measured variables are related to the latent variable, while in CFA the researcher specifies the number of factors required and which measured variables in the data are related to the latent construct variable. Confirmatory factor analysis (CFA) was used to confirm or reject the measurement theory extrapolated by performing the EFA. The CFA includes four distinctive steps:

1. Assessing if assumptions were met,
2. The development of the overall model theory,
3. Study design to produce empirical results, and
4. Assessing the model's validity.

**Assessing if assumptions were met.** The assumptions of CFA consist of a sufficient sample size (e.g.,  $n > 200$ ), multivariate normality, and a priori theoretical model specification. These assumptions were checked before running the CFA. Multivariate normality was assessed utilizing a web tool suite providing numerical and graphical results to provide the basis for reliable decision making. The application uses the multivariate normality test (MVN) package in the statistical analysis software R. The tool provides three multivariate numerical normality tests including Mardia's, Henze-Zirkler's, and Royston's. Additionally, the tool delivers three graphical approaches, including the chi-square Q-Q, the perspective, and the contour plots. The priori theoretical model was established through the EFA procedure.

**The development of the overall model theory.** The results of the EFA defined the overall measurement model theory to be tested through CFA, determining whether the measure

of the construct was consistent with the researcher's understanding of the construct of ON. Essentially, this step of the process tests the measurement model. The new scale displayed adequate construct validity, which was established earlier through expert review of the items and the incorporation of the feedback to improve the initial question pool.

**Study design to produce empirical results.** CFA tests the hypotheses concerning the factor structure obtained from performing the EFA. This optimally matched the observed and theoretical factor structures of the collected data set to conclude the “goodness of fit” of the theorized factor model. The completed CFA will yield several distinct statistics to determine how well the theorized model fit the data and explain the covariation between the variables. These fit statistics (see Table 6) tested all of the parameters simultaneously and included the chi-square/degrees of freedom ratio (Marsh & Hocevar, 1985; Schreiber, Nora, Stage, Barlow & King, 2006), the Bentler comparative fit index (CFI) (Bentler, 1980; Schreiber, et al., 2006 ), the parsimony ratio, and the goodness-of-fit Index (GFI) (Baumgartner & Homburg, 1996; Field, 2013; Schreiber, et al., 2006; Wheaton, Muthen, Alwin, & Summers, 1977).

Table 6.

*The Categories of Model Fit and Their Level of Acceptance*

Name of index	Level of acceptance	Citation
Chi-Square	P-value > 0.05	Wheaton et al., 1977; Schreiber, et al., 2006
RMSEA	RMSEA < 0.06	Hu & Bentler, 1999; Schreiber, et al., 2006
RMR	RMR < 0.08	Hu & Bentler, 1999; Schreiber, et al., 2006
CFI	CFI > 0.95	Schreiber, et al., 2006
GFI	GFI > 0.95	Schreiber, et al., 2006
Chi-Square / df	Chi-Square / df < 3.0	Marsh & Hocevar, 1985; Schreiber, et al., 2006



CFA was used to test the predicted factor structure obtained via EFA. The predicted correlations and error variances of the EFA factor structure were translated into a correlation matrix, which considered expectations about the correlation between the factors and their cross-loadings. The measurement error of the variables was included in the model. To determine the theorized model's fit, it was compared to an additional population sample. The researcher used IBM's SPSS/AMOS software to analyze and calculate the values and produce the matrices discussed in the following section: (a) maximum likelihood estimation, (b) root mean square error of approximation, (c) standardized root mean square residual.

**Maximum likelihood estimation.** The IBM software package AMOS produced the correlation matrices using the mostly maximum likelihood estimation (MLE), while reducing the differences between each matrix without violating the data. The resulting implied matrix was compared with the sample correlation matrix, providing a residual matrix. The residual matrix displayed an approximation of the discrepancies between the study's model values and the hypothesized population values. Some of the discrepancies were assumed to originate from the population sample not being an entirely accurate representation of the total population (Cudeck & Henly, 1991).

**The Root Mean Square Error of Approximation.** The difference between the two matrices was expressed by the root mean square error of approximation (RMSEA), denoted as  $\chi^2$  and its corresponding degrees of freedom. Recommendations indicate that  $\chi^2$  should be small enough in relation to its degrees of freedom to be the result of chance deviations within the sample and not of prediction errors. Indices of the goodness of fit provided an additional basis for the acceptance or rejection of the model. Hu & Bentler (1999) and Schreiber, Nora, Stage,

Barlow, and King (2006) suggested that a value of 0 indicates a perfect model fit and a value  $\leq .08$  as a cutoff value for a good fit.

**The Standardized Root Mean Square Residual.** Jöreskog and Sörbom (1988) proposed using the standardized root mean square residual (SRMR/RMR) to determine the model's fit, where a value of 0 would indicate a perfect fit of the model. Hu and Bentler (1999) and Schreiber and colleagues (2006) suggest a cut-off value of no less than .08 to indicate a good fit. Additionally, the comparative fit index (CFI) was calculated, where a value of 1 would indicate a perfect fit. Therefore, values greater than one are truncated to 1, and values smaller than 0 are raised to 0 to normalize the fit index. The suggested cut-off value for a good fit is indicated by CFI being less than or equal to .95 (Dimitrov, 2012, Schreiber et al., 2006).

**Assessing the Model's Validity.** CFA provided the viable supplementary method for evaluating the instrument's construct validity. In this section, the means to establish the psychometric properties of the developed instrument are described, including (a) content validity, (b) convergent validity, and (c) reliability.

**Content validity.** Aspects of content validity may include the appropriateness, clarity, and comprehensiveness of the items measuring a construct, which can be classified through the evaluation of the instrument items by a group of experts possessing previous experience and/or currently recognized for their competence in the field being studied (Field, 2013). Therefore, content validity was established by acquiring expert opinions and feedback from individuals stating their opinions about whether items seem to be related and, therefore, suitable for inclusion.

**Convergent validity.** Convergent validity tests whether the measured concept was highly correlated with instruments measuring a same or similar construct. Convergent validity was

established by comparing total scores on the B-ORA with total scores on the EAT-26 and Orto-15, which were concurrently administered. High correlations between test scores provided evidence of convergent validity. The CFA determined whether the expected model was consistent with the population data. CFA visibly displayed factor loadings, variances, and the relationships among the latent qualities as evidence of the degree of convergent and discriminant validity. Convergent validity was evidenced by the size of the factor loadings, and discriminant validity was evidenced by small factor covariances (Kenny & Kashy, 1992). The convergent validity of the survey was estimated using Cronbach's alpha. Cronbach's alpha of .9 is generally considered to reflect excellent internal consistency, while a validity coefficient in the .40s or .50s was considered satisfactory (Tinsley & Tinsley, 1987).

**Construct validity.** Construct validity is achieved when the fitness indices values are equal to, or larger than, the cut-off values established for the index being analyzed. The fitness indices indicate how well the items are in measuring their respective latent construct. In the event that the fit indices reflect a poor fit, the researcher would return to the EFA to explore if the theorized factor structure was reasonable or in need of improvement. The researcher assessed for signs of under- or overextraction of factors by reevaluating the rotated and unrotated factor matrices and high cross-loadings on items to determine whether the theorized number of factors needs to be changed.

**Discriminant validity.** Discriminant validity was established using SPSS AMOS to identify the redundancy of items in the model through an inconsistency measure called modification indices (MI). A high MI value indicates that the respective items are redundant. In cases of redundancy, the researcher used the best practice recommending deletion of the identified items and then proceeded to rerun the model. Essentially, the correlation between

constructs should not exceed 0.85. Correlation values exceeding 0.85 indicate that two constructs are redundant or reflect a serious multicollinearity problem.

Additionally, the total scores from the EAT-26 and Orto-15 were correlated to the total score on the B-ORA to assess convergent and discriminant validity, respectively. The researcher hypothesized that there would be a correlation between the total scores of all three instruments, as they measure the magnitude of disordered eating symptomatology (i.e., a higher score on the EAT-26 and a lower score on the Orto-15 and B-ORA being indicative of increased symptomatology). The researcher expects the Orto-15 to have a medium correlation with the B-ORA and the EAT-26. A medium correlation is expected on the grounds that the EAT-26 is a generic assessment for disordered eating, yet addresses obsessive compulsive components of disordered eating, also present in individuals with ON tendencies. The Orto-15 should differ from the B-ORA, as the B-ORA differs in its development and, therefore, its approach to explore ON tendencies.

**Reliability.** The researcher utilized the statistical index of internal consistency, Cronbach's Alpha, to provide an estimate of the true score to error ratio (Gliem & Gliem, 2003); the general rule of thumb is that assessment instruments should have a Cronbach's Alpha of at least .7 ( DeVellis, 2012). The reliability coefficient will provide the statistic of choice, which will determine the reliability of the survey and represent the correlation measuring the intensity and direction of the relationship between the items or variables (see Table 7). Low correlations will indicate items that are not befitting the appropriate domain measured, threatening reliability by introducing error (Cronbach, 1951).

Table 7.

*Interpretation of Cronbach's Alpha*

Cronbach's alpha	Internal consistency
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable
( DeVellis, 2012)	

Moreover, reliability will be established through comparison of expert feedback ratings of the survey items to ensure that perceptions about the quality of each of the items were consistent (e.g., two or more observers rated the same item favorably). A determination of the survey's reliability was the appropriateness/relevance of the item's content. Reliability was also established by editing items using expert feedback, which, in theory, increased the likelihood that the items were understood by the respondent as they were intended by the researcher, therefore providing more meaningful and on target responses. Some content item redundancies were purposeful, providing the foundation for internal consistency reliability. The B-ORA addressed one overall domain (i.e., eating pathology related to orthorexia nervosa) and examined three ways in which the traits behaviors, emotions, and thoughts could manifest, providing item content heterogeneity, another determinant of reliability. Content heterogeneity influences Cronbach's alpha ( $\alpha$ ), and reliability increases when the items in a scale cover only a few traits of the construct to be measured (McCrae, Kurtz, Yamagata, & Terracciano, 2011).

Exploratory factor analysis and confirmatory factor analysis are essential steps in creating a valid and reliable instrument. Where EFA provides the initial factor structure to formulate a theory, CFA tests the hypothesized theory for practical applicability and soundness. The

following manuscript discusses the statistical findings, results of the analyses, and provides a discussion thereof.

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**SECTION II:**  
**MANUSCRIPT FOR SUBMISSION**

**Abstract**

Scholars characterize Orthorexia Nervosa (ON) as a preoccupation with healthy eating leading to restrictive and obsessive eating behavior resulting in pathology. In this article, the researcher will address Eating disorders in college students, Orthorexia, a form of eating disorder, Challenges in diagnosing ON, Limitations of current assessment tools, and Development of the Burda Orthorexia Risk Assessment instrument (B-ORA).

## **Eating Disorders in College Students**

Many college students strive to increase their performance and cognitive functioning through eating healthy and adhering to a strict dietary regiment, which often includes food group restrictions (Hesse-Biber, Leavy, Quinn, & Zoino, 2006; Rodríguez, Salar, Carretero, Gimeno, & Collado, 2015). A study by Jones and colleagues (2014) explored the prevalence rates of eating disorders (EDs) on two U.S. college campuses and found that 0.7% of students screened positive for anorexia nervosa (AN), and 4.7% screened positive for all other EDs, excluding Anorexia nervosa (AN) (Jones, Kass, Trockel, Glass, Wilfley, & Taylor, 2014). Additionally, researchers found that 31.8% of college students were found to be at high risk for developing an ED. Moreover, young adults attending college are at a greater risk of developing an ED, due to increased academic pressures, low self-esteem issues, and unrealistic perceptions of an ideal healthy lifestyle (Bundros, Clifford, Silliman, & Morris, 2016). When and how healthy eating turns into a disorder is a valid question, as not everyone adhering to a strictly healthy diet will automatically develop Orthorexia nervosa (ON) (Brytek-Matera, 2012).

### **Orthorexia Nervosa, a Form of Eating Disorder**

Many students following a healthy eating philosophy believe restrictive dieting increases their performance and cognitive abilities and provides health-improving outcomes (Hesse-Biber, et. al., 2006). Healthy eating has been increasingly emphasized by U.S. media, which has presented most of the information regarding proper health and nutrition for the public and reinforced the belief that healthy eating will address most health-related issues (Chang, James, & Effron, 2014). Many students rely on social media and the Internet for their health information and use what they find to guide their nutritional practices. Often, the information found is confusing and contradictory, making everyday health-related choices frustrating and difficult

(Graham, Cobb, & Cobb, 2016; Wansink, 2006). Nevertheless, the information displayed in commercials, published on government web pages, and described by websites selling supplements and so-called wonder cures determines what the public deems healthy and how we should or should not eat (Stochel, et al., 2015; Wansink, 2006). This cultural trend towards a healthier lifestyle may encourage college students to develop an increased concern about the quality and purity of food, particularly when they aspire to make healthy food choices (Wansink, 2006). However, these healthy eating behaviors can develop into pathology when healthy eating becomes an obsession (Koven & Abry, 2015).

Defined by Bratman and Knight in 1997, ON has become a subject of growing academic research over the past two decades (Koven & Abry, 2015). The term *orthorexia nervosa* (ON) originated from the Greek word *ortho*, meaning right or correct, and the word *orexis*, meaning appetite or desire (Stochel, et al., 2015). Bratman practiced alternative medicine and patients would often ask whether their ailments could be cured through diet changes. Bratman himself was a strong believer in healthy diet and nutrition, yet after two years of extreme eating rituals, he realized that his own diet was no longer healthy; his need to eat healthy had become an obsession. After reflecting on his eating habits and his thoughts and emotions surrounding his dietary habits, he named the condition *orthorexia nervosa*. Curiously, he created an instrument to start collecting information from patients that showed ED-related symptomatology, yet did not strive for thinness but seemed overly concerned with the health-aspects of food (Bratman, 1997). Individuals with ON experience feelings of satisfaction, inflated self-esteem, superiority over others, and spiritual fulfillment from restricting their food choices to what they deem eating healthy (Dunn & Bratman, 2016; Eriksson, Baigi, Marklund, & Lindgren, 2008). Furthermore, individuals suffering from ON feel superior and judgmental towards anyone who does not adhere

to such high standards of healthy eating habits. While individuals with bulimia nervosa (BN) and anorexia nervosa (AN) exert great effort to keep their dietary habits secret, individuals suffering from ON flaunt their dietary habits as superior (Alvarenga, et al., 2012). Individuals suffering from ON become obsessed with the quality and ritual of food preparation, strictly adhering to their rules regarding the ingredients of meals (Stochel, et al., 2015; Bratman, & Knight, 2000).

In the last decade, researchers (Dunn & Bratman, 2016; Donini, Marsili, Graziani, Imbriale, & Cannella, 2005) have suggested the first set of proposed diagnostic criteria for ON based on conducting observations, consulting the available published literature on the subject, and utilizing a case study approach. Subsequently, researchers have focused their efforts primarily on establishing prevalence rates for this emerging disorder using the Orto-15, a self-report assessment based on client observation developed by Bratman and Knight in the late 1990s after observing patients not concerned with body image or weightloss but predominantly occupied with healthy food choices. Researchers who explored the prevalence of ON using the Orto-15 reported unusually high rates, such as 86% for yoga practitioners, 88.7% for nutrition students, and 81.9% for dieticians (Alvarenga, et al., 2012; de Souza & Rodrigues, 2014; Valera, Ruiz, Valdespino, & Visioli, 2014). In a Turkish study utilizing a derivative of the Orto-15, a prevalence rate of 45.5 % was reported, while a study by Aksoydan and Camci (2009) indicated the prevalence of ON as high as 36.4 % for symphony orchestra musicians, 81.8 % for opera singers, 32.1 % for ballet dancers, and 56.4% for performance artists. Fidan and colleagues (2010) reported ON prevalence for medical students was 43.6 %, and Ramacciotti and colleagues (2002) found the prevalence of ON within the general population to be as high as 57.6%. A study by Morris and colleagues (2016) examined the prevalence of ON using the Orto-15 with a convenience sample of 448 predominately female (79%) college students and found a prevalence

of 81%, a rate higher than the rate found in previous studies (Ramacciotti, Dell'Osso, Paoli, Ciapparelli, Coli, Kaplan, & Garfinkel, 2002). Turkish studies reported estimates of ON to be 43.6% among medical students (Fidan, Ertekin, Işıkay, & Kirpınar, 2010). Researchers who explored the prevalence of ON in particular populations reported rates as high as 80%. Such rates do not correlate with current understanding of eating disorders, which affect about 2% of the general population (Smink, Van Hoeken, & Hoek, 2012). These unusually high prevalence rates might be due to a lack of scientific understanding of the concept of ON, paired with the fact that the origins of initial ON assessment instruments were rooted in observations and limited research literature on the subject (Bratman, & Knight, 2000; Stochel, et al., 2015).

While longitudinal studies about ON are currently unavailable, researchers suspect that extreme ON-related dietary behaviors can result in medical complications identical to AN, including, but not limited to, bradycardia (extremely slow heartbeat), osteopenia (bone density that is lower than normal), testosterone deficiency, malnutrition, and anemia (Moroze, Dunn, Holland, Yager, & Weintraub, 2015; Park, et al., 2011). Food becomes the central focal point in the student's life at the expense of social relationships, academic performance, hobbies, and activities; the nutritional value of the food takes precedence over the taste and enjoyment of food. Individuals with ON often become highly agitated and extremely anxious when they cannot adhere to their self-imposed preset dietary requirements. The high anxiety experienced motivates the individual to engage in obsessive behaviors in an attempt to provide temporary relief. This obsession leads individuals to avoid food purchased or prepared by others.

Consequently, individuals will distance themselves from friends and family, driven by the fear that eating anywhere but at home will make it impossible to abide by their diet. Researchers and health practitioners still do not know how to recognize when ON-related tendencies become

maladaptive and how to differentiate healthy eating from healthy eating habits that may have hazardous consequences. Currently there is not enough knowledge available about ON to warrant any assumptions. Therefore, collecting and assessing data exploring the latent factors of ON is the next essential step towards creating new knowledge for future ON-related research.

The Orto-15 still remains the top choice for research studies conducted on ON, but it has been criticized by its developer Dr. Bratman himself (personal communication, 2015) and other researchers. Adaptations of the Orto-15 are used outside the United States and remain the primary instruments utilized for data collection on ON (Bundros, et al., 2016; Missbach et al., 2015; Stochel, et al., 2015; Varga, Thege, Dukay-Szabó, Túry, & van Furth, 2014).

### **Challenges in Diagnosing EDs including ON**

Limitations in current treatment-related research include a lack of consistent efficacy, the paucity of data, and the need for tailored treatment approaches for healthy eating disorder types; these limitations present major challenges in efforts to diagnose ON (Peterson, Becker, Treasure, Shafran, & Bryant-Waugh, 2016). The majority of research into the treatment of eating disorders on college campuses has focused on BN and evidence-based management aspects of the disorder. Fairburn and colleagues (2008) posed an interesting viewpoint, stating that the real problem concerning EDs is associated less with the symptoms of EDs and more with culturally and socially reinforced unhealthy attitudes and beliefs regarding a person's shape and weight. College students especially experience increased pressures related to academic performance, peer socialization, and family expectations, leaving them vulnerable to developing clinically significant disturbances in eating (Volpe, et al., 2016). In a U.S. population study conducted by Hudson, Hiripi, Pope, and Kessler (2007), the age for the onset of eating disorders was between 18 and 21 years old, the age bracket where most young adults start college. ON prevalence rates

do not correlate with our current understanding of eating disorders and affect about 2% of the general population (Smink, van Hoeken, & Hoek, 2012). Therefore, the first step in a long line of research seems the continued collection of data surrounding ON tendencies to meet future challenges because without clear-cut and evidence-based diagnostic criteria, diagnosing and treating ON poses a formidable challenge, and without future research exploring the construct of ON, deducing diagnostic criteria is equally challenging.

### **Limitations of Current Assessment Tools**

Despite the attention ON has received in media and the medical communities, many doctors have argued that a separate diagnosis for ON was presently unwarranted. The reasoning for non-inclusion of ON in the Diagnostic and Statistical Manual of Mental Disorders, Fifth edition (DSM-5) was that ON might be related to anxiety disorders or might represent a precursor to a commonly diagnosed mental condition (Rochman, 2010). Even with its overlapping symptomatology with AN and obsessive-compulsive disorder (OCD), ON's pathological pattern differentiates it from currently recognized eating disorders specified in the DSM-5 and warrants increased examination in its own right (Figure 2) (Koven et al., 2015).

The two main assessments used in research on ON are the Eating Attitudes Test (EAT-26) and the Orto-15. Scholars utilize these instruments in the majority of research on eating disorders on college campuses. The EAT-26 is a self-administered test used to determine general dysfunctional eating habits; it neither focuses on any specific eating disorder, nor can it be used for diagnostic purposes (Williams, Hand, & Tarnopolsky, 1982). In contrast, Bratman and Knight's (2000) Orto-15 was conceptualized utilizing long-term observations of their clients' unique pathology while practicing alternative medicine and was specifically designed to recognize pathology in individuals they thought to be suffering from ON. The Orto-15 was



adapted and revised for use outside the United States and is currently the foremost instrument for assessing ON. Bratman himself criticized the instrument for capturing individuals simply concerned with food quality or following a vegan or vegetarian diet, as these individuals lack the magnitude of symptomatology associated with ON pathology (personal communication, 2016). As Stochel and colleagues (2015) stated, there are insufficient psychometrically sound instruments to assess ON, which may be due to the lack of evidence-based diagnostic criteria and lack of research exploring how distinctive ON is from current eating disorders recognized by the DSM-5 (American Psychiatric Association, 2013; Donini, et al., 2005; Rodríguez, et al., 2015; Koven, & Abry, 2015).

The purpose of this research was to utilize currently proposed diagnostic criteria and current ON-related literature to create a survey instrument exploring participants' behaviors, emotions, and thoughts surrounding their dietary habits. Two decades after the development of the Orto-15, research surrounding ON has drastically increased, providing a much larger knowledge base to draw from in developing a new screening instrument, including the first two independent publications of proposed diagnostic criteria (Dunn, et al., 2016; Moroze, et al., 2015). Furthermore, researchers with an increased interest in the phenomenon of ON argue that the development of a instrument assessing ON is essential at this juncture to provide an alternative measurement option to either strengthen, dispute, or further explore current research findings in the field (Brytek-Matera, 2012; Koven, & Abry, 2015; Missbach, Dunn, & König, 2015)., The Burda-Orthorexia Risk Assessment (B-ORA) was constructed specifically for use with a U.S. college student population while most other instruments were adaptations of the Orto-15 for research conducted outside the US. These derivatives of the Orto-15 resulted in

increased psychometric properties of the instruments used to gain further insight into ON tendencies; currently there is no U.S. equivalent to serve further ON-related research efforts.

Korinth, Schiess, and Westenhoefer (2009) conducted a study using a group of German university students who studied nutrition ( $n = 219$ , 195 female,  $M$  age range = 22.5 to 25.7) and found that there were no statistically significant differences in ON symptomatology between the students studying nutrition and the students pursuing other degree plans. An Australian study by Kinzl, Hauer, Traweger, and Kiefer (2006) investigated the prevalence rates of ON in dieticians ( $n = 283$ ,  $M$  age = 36.2 years) and found that 52.3% displayed ON symptomatology while 34.9% displayed ON-specific behaviors and 12.8% fit their description of having ON. A study by Morris and colleagues (2016) examined the prevalence of ON using the Orto-15 with a convenience sample of 448 predominately female (79%) college students, determining a prevalence of 81%, a rate higher than that found in previous studies. Turkish studies reported estimates of ON to be 43.6% among medical students (Fidan, et al., 2010) and 45% among resident medical students with no significant differences between genders (Bosi, Camur, & Güler, 2007). Many studies are indicative of a high ON prevalence rate for students in health profession fields; the prevalence rates for ON on college campuses seem unusually high when viewed in the context of the prevalence of eating disorders on campuses at large (Bosi, et al., 2007; Bundros, et al., 2016; Eisenberg, Nicklett, Roeder, & Kirz, 2011; Martínez-González, et al., 2013). The Burda-Orthorexia Risk Assessment (B-ORA) was not designed to be a diagnostic tool, but was designed to provide the means for further exploration of ON risk factors on college campuses. The B-ORA may provide additional knowledge surrounding ON in a sample of U.S. College students. Therefore, the research questions for the development of the B-ORA were formulated as follows.

## **Research Questions**

The researcher answered the following four research questions in the development of the B-ORA instrument exploring ON related tendencies:

1. What are the underlying factors/dimensions of the B-ORA instrument?
2. What is the internal consistency reliability of the B-ORA with a sample of college students?
3. To what extent do scores on the B-ORA correlate with scores on the EAT-26 and Orto-15?
4. What is the degree of validity associated with the internal structure of the B-ORA?

## **Development of the Burda Orthorexia Risk Assessment instrument, the B-ORA**

### **Methods**

In the following methodology the researcher will address the procedures utilized in answering the above research questions: (1) Participants, (2) Instruments, (3) Procedures, (4) Results, (5) Study Limitations and Future Research Recommendations, and (6) Conclusion.

### **Participants**

The present study utilized data from college students, 18 years or older, enrolled in four-year degree-granting institutions across the United States, including public and private universities. Data were collected from July 2017 through December 2017. Initially, college students attending four-year degree-granting institutions ( $n = 101$ ) were recruited via email sent to college professors throughout the US requesting they distribute to their students a participation solicitation and the anonymous link to a Qualtrics survey. These participants were extended an opportunity to be entered into a drawing for eight \$50 Visa gift cards to be distributed once data

collection was completed. Furthermore, additional college students were recruited by purchasing their participation through Qualtrics ( $n = 578$ ). Qualtrics participants are recruited from various sources, including website intercept recruitment, member referrals, targeted email lists, gaming sites, customer loyalty web portals, permission-based networks, and social media and are compensated by the corporation. The survey response rate was 18%; about 7500 invitations were sent out and 1324 respondents actually entered and started the survey. Of those 1324, about 800 either screened out of the survey on a screening question or dropped out of the survey and did not submit a response. The remaining participants' response rates could not be determined because the initial recruitment email was sent to the course instructor with no means of knowing how many of the students actually received the invitation to participate. The survey invitation was a generic invitation to participate providing an anonymous hyperlink which took the respondent to the survey and mentioned the incentive offered.

IBM's Statistical Package for the Social Sciences (SPSS) was used to analyze the participants' age demographic; their ages ranged from 18 to 72 years with a median age of 23.16 ( $SD = .27$ ). The majority of participants were in the age bracket of 19 to 24 years old with the highest percentage for 21-22 years of age (21 = 14.8 %, 22 = 14.6 %). Due to the free-text answer option in collecting the demographics concerning nationality some answers were inconclusive and were omitted. The majority of the individuals in the sample identified as Caucasian (30.2 %), followed by African Americans (16.3 %), Hispanics (8%), Asians (2.2 %), Indian (1.5 %), and Mixed Race (1.2%). Out of the sample ( $n = 589$ ), 46.9 % ( $n = 276$ ) of college students reported a history of disordered eating in the family. Furthermore there were 58.9 % ( $n = 347$ ) female participants, 39.9% ( $n = 235$ ) male participants, and 1.2 % ( $n = 7$ ) of

participants that identified as “other.” As to the question of whether there was a history of EDs in the family, 46.9% of participants answered the question with *yes*.

### **Instruments**

The Orto-15 and EAT-26 are the prevalent instruments of choice when measuring EDs and ON specifically (Alvarenga, et al., 2012; Arusoğlu, Kabakci, Köksal, & Merdol, 2008; Bosi, et al., 2007; Donini, et al., 2005; Fidan, et al., 2010; Missbach, et al., 2015; Stochel, et al., 2015; Valera, et al., 2014). Cronbach’s alpha for the original version of the Orto-15 is insufficient at .30, as reported by Missbach and colleagues in 2015, yet it remains the instrument of choice in the majority of research conducted on ON. Las Hayas and colleagues (2006) stated the EAT-26’s is another instrument commonly used by researchers to assess for disordered eating; its Cronbach’s alpha was 0.79. These two measures established the convergent validity for the B-ORA.

The Orto-15 was conceptualized utilizing Dr. Bratman’s orthorexia self-test based on long-term observations of his clients’ unique pathology; it was specifically designed to recognize ON pathology in individuals he thought to be suffering from ON. The Orto-15 assessment addresses beliefs and attitudes in food selection (item 4), the degree to which food apprehension influences daily life (item 7), the perceived result of consuming only healthy foods (item 12), and general habits of how food is consumed (item 15). A lower score refers to the presence of ON tendencies and a score below the cutoff indicates the presence of ON (cut-off score < 40, where 60 = maximum score) The Orto-15 uses a Likert-type response system where *always* = 1, *often* = 2, *sometimes* = 3, and *never* = 4. The Orto-15 was reported with a Cronbach’s alpha ranging from .3 to .6 depending on the language version, indicating insufficient reliability (Missbach, Dunn, & König, 2015; Missbach, Hinterbuchinger, Dreiseitl, Zellhofer, Kurz, & König, 2015).

Many researchers criticize the Orto-15 for producing exceptional high prevalence rates by capturing individuals simply concerned with food quality or following a vegan or vegetarian diet and who lack the magnitude of symptomatology where healthy eating becomes dysfunctional (Bundros, et al., 2016; Missbach, et al., 2015; Stochel, et al., 2015; Varga, Dukay-Szabo, & Tury, 2013). With all the shortcomings of the Orto-15, it is still the instrument used in the majority of research providing the currently available data on ON.

The EAT-26 is predominantly used to assess disordered eating, including obsessional tendencies surrounding dietary habits. The 26-item instrument utilizes a 6-point Likert-style response format. (Forney & Ward, 2013; Juarascio, et al., 2011; Levitt, 2008; Paulson & Rutledge, 2014). EAT-26 is an efficient tool for screening in which individuals with a score at or above a cut-off value of 20 are recommended to seek additional help and be screened for possible presence of an eating disorder (Ocker, Lam, Jensen, & Zhang, 2007). The EAT-26 was designed for use in nonclinical setting and should be administered by trained health care professionals. The EAT-26 psychometric properties were reported by Garner, Olmsted, Marion, Bohr, Garfinkel (1982) with a validity coefficient of  $r = .9$  and a reliability coefficient of  $\alpha = .9$  utilizing a sample of women.

The EAT-26 has been compared to variations of the Orto-15 in most research conducted on ON and was, therefore, considered as a valid instrument in establishing convergent validity. Individuals who receive a low score on the Orto-15 and a high score on the EAT-26 demonstrate an increased risk for disordered eating behaviors; similarly, a lower score on the B-ORA indicates a higher susceptibility towards disordered eating behaviors and the increased presence of maladaptive thoughts and emotions surrounding an individual's dietary habits.

## **Procedures**

**Support of Content Procedure.** The initial item pool was based on feedback received from expert panel members; questions the experts identified as inadequately addressing the concept of ON were edited and items perceived as being redundant were eliminated. In addition, the B-ORA was presented to six laypeople to review grammar, flow, comprehension, and overall feel and look of the survey and its items. Out of the 63 questions, seven items were rewritten to increase clarity of item prompts. Finally, those items that received the majority of unfavorable evaluations from lay reviewers were crosschecked with the experts' edits to determine whether items were better suited for a rewrite or elimination. Fifteen questions were edited, four questions were completely reworded, four questions were deleted, and two new questions were added based on the suggestions provided by the expert reviewers. This resulted in an initial version of the instrument containing 61 questions, of which six were designed to function as cognitive stops for participants and as a tool for the researcher to recognize erroneous inliers; they are not scored and were not included in the final analysis.

**Data Procedures.** The collected data were then analyzed using SPSS for missing data, outliers, and unusable data entries, including inconsistencies and strange patterns. The missing data constituted less than 5% and were, therefore, replaced with the mean substitution method. SPSS was used to determine the dataset outliers; they were visually inspected, and outliers as a result of strange patterns were deleted. The remaining outliers were kept because these data entries may represent disordered eating habits, which are not the norm. Additionally, the dataset was visually examined multiple times for erroneous inliers, which were also deleted. Next, the data was analyzed for its distribution. The Shapiro-Wilks statistic returned a significant p-value ( $p < .001$ ), indicating a non-normal data distribution. The researcher proceeded to consult Kurtosis and Skew of the distribution in evaluating whether data transformation would be

necessary. Recommendations for estimation of the tolerance of the skew indicate a substantial departure from normality as an absolute skew value  $> 2$  and for kurtosis an absolute value of  $> 7$ . (Kim, 2013; West, Finch, & Curran, 1995). The researcher considered the skew of the data, ranging from .038 to .56, and the kurtosis, ranging from 1.12 to 1.38. These values were not pronounced enough to warrant the use of data transformation because EFA is a robust analysis and performs satisfactorily with skewed data sets (Tabachnick, & Fidell, 2013).

After conclusion of the data cleaning process, a total of 589 participants remained for analysis. They were randomly divided into two groups: one for the initial factor analysis ( $n = 360$ ,  $f = 214$ ;  $m = 141$ ) and the other for the confirmatory factor analysis ( $n = 229$ ,  $f = 146$ ;  $m = 80$ ).

The sample size ratio was determined by consulting a research literature analysis by Osborne and Costello (2009) that explored the most commonly used sample size ratios for EFA; they found that the highest percentage of research studies utilized a 5 to 1 ratio. Furthermore, Izquierdo, Olea, and José Abad (2014) argued that a large sample size is less important than the proportion of variances explained by the common factors, the correlation among factors, and the number of variables that define each factor. A minimum sample size of 315 was determined to be sufficient for the EFA, and a sample size of more than 200 for the CFA was considered satisfactory (Field, 2013; Mundfrom, Shaw, & Ke, 2005). Mundfrom and colleagues stated that an EFA can be conducted with as few as 200 participants if there are more than seven items in a factor. The main determinant for factorability of the EFA dataset was determined by the Kaiser-Meyer-Olkin (KMO) value produced by the SPSS analysis. The through EFA extrapolated theoretical model was then confirmed using CFA.



## Results

### Results Regarding Internal Structure

#### Exploratory Factor Analysis

To assess the suitability of the sample for factor analysis, the researcher used the Kaiser-Meyer-Olkin (KMO) statistics, ranging from 0 to 1. A value within the range of .9 to 1 indicates a data set highly suitable for factor analysis. The KMO measure of sampling adequacy was found to be excellent at .98, indicative of high data appropriateness for factor analysis. After ensuring the data's appropriateness for factor analysis, the researcher used Principal Axis Factoring procedure to extract the initial factor structure. Utilizing the factor retention criteria of .32 or higher to indicate a valid loading (Field, 2013), the data supported a one-factor structure explaining 54.44% of the variance in the ON data sample. Because the factor had more than seven items loading at .49 or higher (Table 1), the researcher considered the factor stable. The factor includes 21 items, and with a rotated sum of square loading of 16.46, accounted for 53.08% of the variance. The researcher labeled this factor *ON* because the items loaded describe the latent factor, indicative of increased ON related tendencies. To estimate the emerging instrument's reliability, the researcher calculated Cronbach's Alpha. Additionally, the researcher calculated the average variance extracted (AVE) to estimate the discriminant validity of the B-ORA. The AVE calculated was .72, which greatly exceeded the recommended threshold value of .50, denoting an satisfactory discriminant validity of the B-ORA (Raykov, & Shrout, 2009).

The total number of questions remaining constitutes the 27-item B-ORA: factor one with 21 questions and six reverse scored control questions. The highest score achievable is 84, the lowest 21, where *I agree* = 1, *I somewhat agree* = 2, *I somewhat disagree* = 3, and *I strongly*

*disagree* = 4. The items related to other disordered eating habits were designed as reverse coded or negatively worded items, serving as cognitive stop signs for participant to provide a more controlled response, and avoid automatic engagement; these six questions are not scored and were omitted during EFA (Chen, Rendina, & Dedrick, 2007; Sauro & Lewis, 201; Gliem, & Gliem, 2003). Once the factor extraction provided an a priori theoretical model, the researcher proceeded to test the model using Confirmatory Factor Analysis (CFA) utilizing SPSS/AMOS. The Analysis of Moment Structure software (AMOS) is an additional SPSS module and is expressly used for Structural Equation Modeling, path analysis, and confirmatory factor analysis.

Table 1.

*Pattern Matrix for the One-Factor Solution*

	Factor
	ON
I feel terrible and disgusted with myself when I eat something that might not be perfectly healthy	.901
When someone asks me to go out to eat, I start feeling anxious because	.892
I worry about having to make excuses to not eat unhealthy foods	
I get worried and apprehensive when I think about the unhealthy ingredients in my foods	.891
I judge people's character by their eating habits	.846
Eating out, I cannot stop worrying about the quality of the food I just ate	.801

Table 1.

*Pattern Matrix for the One-Factor Solution continued*

	Factor
	ON
I am utterly disgusted when I am around foods I believe to be unhealthy	.797
I am worried sick that there might be unhealthy ingredients in my foods	.788
I have trouble falling asleep because I am thinking about upcoming food choices	.762
I cannot go to sleep without thinking about and planning tomorrows meals	.739
I feel badly about myself but thinking about my diet improves my mood	.653
If I eat even a small amount of food that is not healthy, I feel tired, have headaches and feel unwell.	.652
Most of the day I think about what I am going to eat next	.635
I often feel nauseous when I eat food that I didn't prepare because I don't know for certain the foods nutritional content	.626
If I eat even a small amount of unhealthy food, I am worried I will get sick	.613
My diet is superior to the eating habits of other people	.557
Eating exclusively healthy foods makes me a good person	.493

**Confirmatory Factor Analysis**

**Primary Analysis.** The primary analysis of the B-ORA scale revealed a significant Chi-Square for the hypothesized model,  $\chi^2_{(184)} = 287.56$ ,  $p < .001$ , and suggested an unacceptable fit of the data. When working with larger datasets, it is common to encounter a chi-square value that is significant (Fields, 2013). Therefore, the researcher used fit indices less susceptible to sample size for higher reliability. The fit indices utilized were the Chi-square Mean/Degree of Freedom (CMIN/DF), Root Mean Square Residual (RMR), Goodness of Fit Index (GFI), Comparative Fit

Index (CFI), and Root Mean Square Error of Approximation (RMSEA). After adjusting the model by pairing the error terms (Figure 4) the indices indicated a satisfactory model fit with  $CMIN/DF = 1.56$ ,  $RMR = .039$ ,  $GFI = .89$ ,  $CFI = .97$ ,  $RMSEA = .05$ . The benchmarks utilized in the determination of the goodness of fit indices were established by Schreiber, Nora, Stage, Barlow and King (2006), who stated that an  $RMSEA < 0.06$ , an  $RMR > 0.08$ , and a  $CFI > 0.95$  specifies a good model fit. Baumgartner and Homburg (1996) stated a  $GFI > 0.90$  and Schreiber and colleagues (2006) stated a  $GFI > 0.95$  is indicative of a good model fit. Marsh and Hocevar (1985) set the Chi-Square/df  $< 3.0$  benchmark to signify a good model fit and Schreiber and colleagues 2006 stated that Chi-Square/df  $< 2.0$  to  $< 3.0$  is indicative of a good fit.

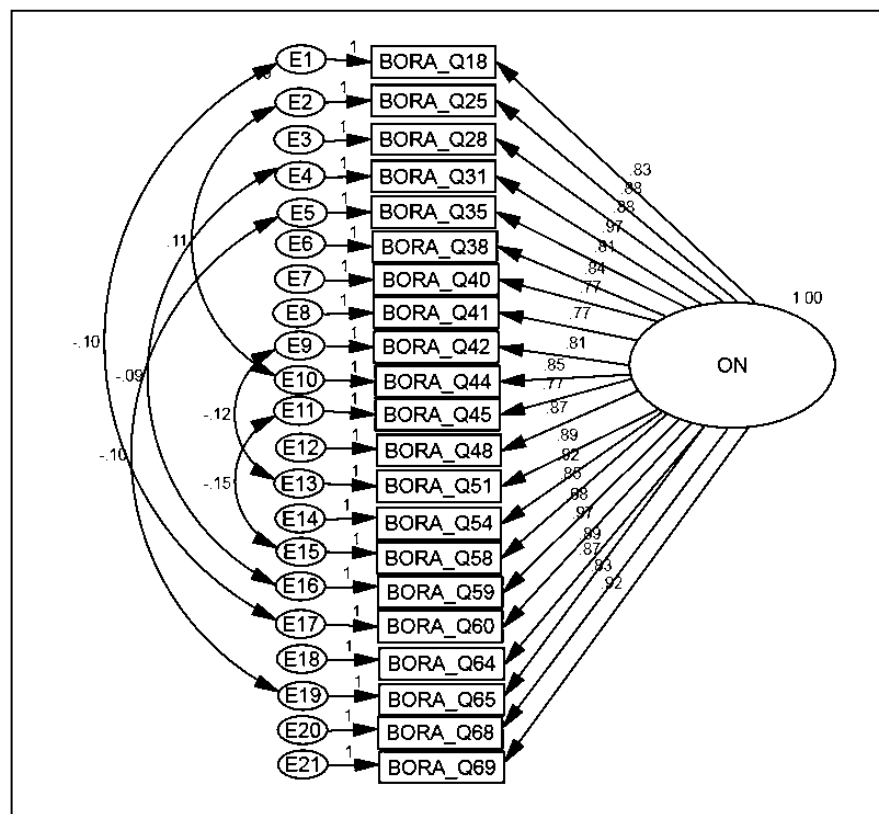


Figure 1. CFA Diagram for the 21 Question B-ORA: pairing of error terms.

Once the final model was identified, the internal consistency of the B-ORA instrument was established by calculating Cronbach's alpha. The models Cronbach's alpha was .972,

indicating high consistent intercorrelation among instrument items indicative of excellent internal consistency (Cronbach, 1951).

### **Convergent Validity**

The Pearson product-moment correlation coefficient indicated a positive correlation between the total scores of the B-ORA, Eat-26, and Orto-15 providing preliminary evidence substantiating convergent validity. Bivariate correlation analysis of the total scores on the B-ORA and the total scores on the EAT-26 indicated a statistically significant positive relationship,  $r = .45, p < .01$ , indicative of a medium effect size. The correlation analysis of the total scores on the B-ORA and the total scores on the Orto-15 also indicated a statistically significant positive relationship,  $r = .40, p < .01$ , indicative of a medium effect size. The researcher assumed some correlation between the B-ORA and the Orto-15 because both instruments address the exact same construct, yet the significant  $p$ -value indicates that they differ in their approach to explore the latent construct of ON. Furthermore, the final B-ORA version's had a Cronbach's alpha of .97 and indicates sufficient internal consistency (Field, 2013).

The B-ORA was constructed predominantly by consulting current ON research, where researchers utilized a derivative of the Orto-15 for lack of a better instrument in obtaining additional information about ON. This might also be a reason why the EAT-26 is the secondary instrument chosen by researchers to conduct ON research. The Eat-26 has AN- and OCD-specific questions that correspond to the overlapping symptomatology found between AN, OCD, and ON (Figure 2). EAT-26 also had a medium effect size indicating some commonality, which may originate from the obsessive-compulsive agenda incorporated in both instruments.

## Discussion

The aim of this study was to create a new instrument and validate its design and its feasibility for measuring Orthorexic tendencies in a sample of college students. The first step in creating the B-ORA was to extract and explore the factor structure of the emergent instrument. Utilizing the data collected from a sample of 360 students, the EFA was performed using principal axis factoring and an oblimin rotation. This analysis indicated a one-factor solution, which the researcher named *ON* for Orthorexia Nervosa because all items related to this latent construct. The extrapolated factor consisted of 21 questions.

The second step was to confirm the extrapolated factor structure of the B-ORA through CFA with a sample of 229 college students. Subsequently, after pairing error terms (Figure 1), the fit indices indicated a satisfactory model fit for the B-ORA despite the low GFI, which was 0.89 and did not achieve the recommended .95. A Cronbach's alpha of .97 exceeded the .70 expected by standard conventions indicating that the scores on the B-ORA have consistency and accuracy justifying the instrument's utilization for future research, as well as clinical and exploratory applications for college students. In the final step of validating the B-ORA, convergent validity was appraised by correlating scores on the B-ORA with instruments currently in use to assess similar and identical constructs. The B-ORA has statistically significant positive relationships with the EAT-26 and the Orto-15. The results indicated that the scores derived from administering the B-ORA measured the construct defined. The B-ORA has sufficient model fit indices compared to common reference standards and produced viable information about the construct of ON. The B-ORA may provide the means to broaden the understanding and conceptualization of ON and may aid in the better understanding of the pertinent psychological constructs underlying this alleged new eating disorder. As a self-report

instrument that is easy to administer and score, the B-ORA can be used with college populations to ascertain their relationship with food and healthy eating habits. Moreover, the B-ORA may indicate if further exploration of ON related factors is warranted and provide the basis to discuss if the college student's relationship with food has a negative impact on their life quality and school performance.

The psychometric evaluation indicates a viable instrument and supports its use for exploration of ON-related food-relationships in college student populations. The B-ORA could be useful as a screening and exploratory instrument when disordered eating is suspected. A low score on the B-ORA indicates a high tendency to engage in ON-related behaviors, denoting that further exploration may be warranted. Health providers may follow up with individuals scoring low on the B-ORA using motivational interview strategies to explore internal motivations for engaging in ON-related behaviors and collaborate with the clients in estimating if the clients would benefit from any changes in their current approach to healthy eating.

Without assessing for ON tendencies, a counselor may use evidence based treatment approaches for the currently recognized eating disorder AN or may utilize treatment approaches recommended for OCD, due to the similarities in the manifestation of disordered eating behaviors currently associated with ON (Figure 2). Yet ON's underlying motivations for engaging in such behaviors vary greatly from AN and OCD, and counselors may find their treatment approach less effective. Moreover, medical staff and health professionals may find somatic concerns in patients and not suspect that an unhealthy healthy eating regiment is contributing to the presenting issues. Administering the B-ORA in frequent intervals of treating ON-related tendencies may help health professionals to estimate treatment efficacy and if changes in treatment approaches might be helpful.

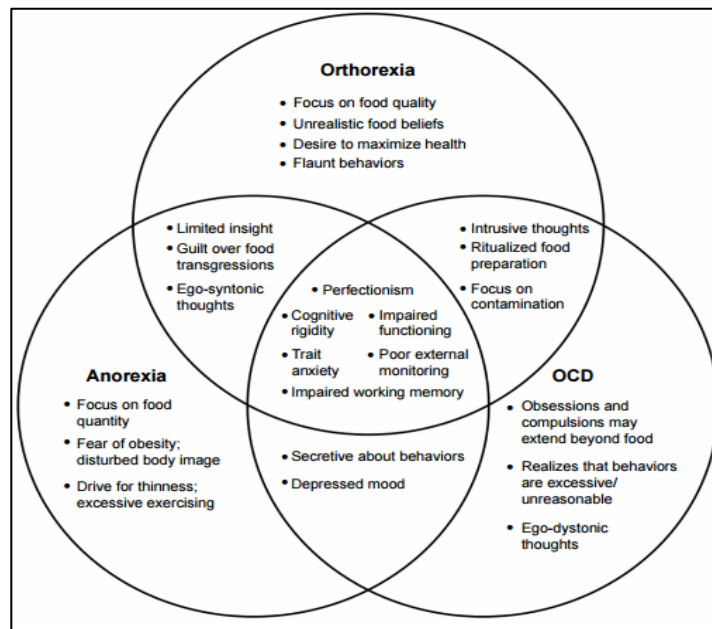
Previous studies concerned with establishing prevalence rates for ON and the high percentage of students identified with ON symptomatology argue that many students are, in fact, concerned with healthy eating. As a screening tool, the B-ORA may help identify the college students that emphasize healthy eating, are practicing restrictive dietary habits, or may have to avoid certain foods due to allergies. The utilization of the B-ORA may facilitate increased awareness and understanding of ON and, therefore, aid in the task to further define the ON construct and broaden the understanding surrounding its relationship with other mental disorders.

Although the design produced evidence for the B-ORA's content, internal structure, and convergent validity, the findings are preliminary as no other study exists to confirm or refute these findings. Therefore, future research is imperative to confirm the factor structure utilizing similar samples, and in providing test-retest reliability for the B-ORA. Confirming the factor structure and confirmatory analysis results of the instrument would provide greater generalizability and increase confidence in the psychometric properties of the B-ORA as a useful measurement tool.

Often healthy dietary behaviors are encouraged and admired, making it hard for college health providers, student services, and college students to realize that an issue even exists; in contrast, college students may display severe health-related issues, yet clinicians might not suspect that an inadequate healthy diet may be the cause. College health providers and counseling services may experience limitations in the effectiveness of evidenced-based treatment approaches, for example OCD, if the compulsions are related to ON tendencies, which differ from the symptomatology associated with OCD (Figure 2). The challenge in treating ON-related tendencies remains in discovering that such tendencies are present and collecting additional data to further clarify facets of the ON construct. ON-related tendencies are often seen as positive



health behavior aspects by clinicians and college students, and, therefore, may not be explored as an aspect of unhealthy relationships with food (Missbach, et al., 2015).



*Figure 2.* Co-occurring Symptomatology of ON, AN, and OCD. Reproduced with permission from Koven & Abry, (2015)

Unlike the Orto-15 and its adaptations currently designed to assess ON, the B-ORA presents with sufficient psychometric properties. Additionally, the one-factor solution supported by the EFA and confirmed by the CFA allows for the increased support and more on-target interventions designed to address ON-related tendencies because ON is currently not an ED defined by the DSM-5, and no treatment rationale exists for the condition. The societal acceptance of individuals striving for a healthier lifestyle may contribute to the problem that some behaviors attributed to ON are more difficult to change and recognize than those associated with EDs currently established in the DSM-5 (Simpson & Mazzeo, 2017).

### **Study Limitations and Future Research Recommendations**

This study provided merit for the utilization of the B-ORA for quantifying the degree of ON-related tendencies in college students; however, this study has some limitations to consider in relation to generalization, including its use for other populations and cultures. Although the design produced evidence of the B-ORA's content, internal structure, and convergent validity, the findings are preliminary as no other study exists to confirm or refute these findings. Therefore, future research is imperative to confirm the factor structure utilizing similar samples and eventually expanding the samples to include students of differing ethnic identities and geographic locations. Another limitation is that the sample was largely composed of college students predominantly consisting of female participants.

The lack of an operationalized definition of ON limits the content validity of the B-ORA; an extensive review of literature was conducted to minimize this possible limitation. A literature review by Varga and colleagues in 2014 found a total of 18 references in PubMed concerning orthorexia nervosa, five related articles on Medline, a single book chapter written by Schwain, and one book, written by Bratman and Knight (2000) (Varga, et al., 2014). Research literature has drastically increased since the development of the Orto-15, including the formulation of proposed diagnostic criteria available since 2016, utilized in the construction of the B-ORA. As of January 2017, there were 47 published articles in PubMed, 70% of which were published in the last five years, a significant increase since 2014; yet most of the research was conducted outside of the U.S.

Furthermore, the instrument is a self-report instrument and therefore may contain biases producing less accurate outcomes. Development of the B-ORA was based on suggested diagnostic criteria and research utilizing the psychometrically insufficient Orto-15 and its

psychometrically improved adaptations to extrapolate knowledge concerning ON. The results from continuing studies may support further adaptation to the B-ORA and an increase in the validity of scores. Furthermore, the B-ORA may provide additional exploratory information to advance ON related research in the U.S.

### **Conclusion**

In summary, this study aimed to develop an ON assessment instrument, including the initial examination of its emerging psychometric properties in a sample of four-year college students. The researcher set out to validate the B-ORA and find evidence for its use with college student populations. The study's findings indicate the B-ORA is a potentially convenient instrument, easy to administer and score for student services personnel and health service providers.

The B-ORA explores the tendency to eat healthy food and some possible motivations leading to disordered eating habits. The B-ORA explores the preoccupation with restrictive dieting that differs from the overlapping psychopathology of ON, OCD and AN and explores the associated attitudes that accompany ON. College students with low scores on the B-ORA are concerned about healthy diet and healthy lifestyles. These individuals will spend a substantial amount of time and financial resources purchasing, planning, and preparing foods considered healthy and health-beneficial. This interest in a healthy diet is in accordance with an increased sense of self, often reinforced by media and clinicians and admired by others; these attitudes towards food become a compulsive rigid way of life. The transition from the simple motivation to eat healthy to a state of being overly concerned and overwhelmed by increasing preoccupations surrounding food may lead to impairment in daily functioning. Negative consequences of the pathological relationship with their food include high anxiety, self-

atonement, loss of self-esteem, social isolation, and constant guilt following the smallest transgression from their diet. (Bundros, et al., 2016). The 27-item final version of the B-ORA instrument, consisting of 21 scored items and six control questions, provides researchers and student support services with a brief instrument for addressing concerns surrounding ON-related tendencies. Researchers can use the B-ORA as an exploratory and fact finding instrument for future operationalizing of ON, providing a unified definition and measurability of the construct for future research. The B-ORA may be used to extend current knowledge of ON and better understand the underlying psychological factors, including the emotions, motivations, and the behavioral expressions associated with ON.

The B-ORA can be used by campus wellness services and on-campus counseling and health providers when eating related issues are suspected; it can aid in the further exploration of the food-related motivations that may lead to pathology. Additionally, clinicians can use the B-ORA as a tool for exploration of healthy dietary habits and estimate if the identified eating related tendencies warrant further clinical attention. Furthermore, students may benefit from access to college programs and services designed to address some of the areas identified as unhelpful or as distressing relationships with food. Additionally, further research utilizing the B-ORA might elucidate on the clinical impairment associated with ON and supply health professionals with more accurate knowledge about the condition. The B-ORA might also provide the necessary data to substantiate the relationship of ON's overlapping symptomatology with other currently recognized eating disorders and if ON is differential enough to sustain itself as a new eating disorder. The researcher believes this research will make a significant contribution to the professional counseling and health literature.

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## SECTION III

### APPENDICES

#### Appendix A

##### **Proposed diagnostic criteria for ON (Dunn, & Bratman, 2016)**

**Criterion A.** Obsessive focus on “healthy” eating, as defined by a dietary theory or set of beliefs whose specific details may vary; marked by exaggerated emotional distress in relationship to food choices perceived as unhealthy; weight loss may ensue, but this is conceptualized as an aspect of ideal health rather than as the primary goal. As evidenced by the following:

Compulsive behavior and/or mental preoccupation regarding affirmative and restrictive dietary practices believed by the individual to promote optimum health.

Violation of self-imposed dietary rules causes exaggerated fear of disease, sense of personal impurity and/or negative physical sensations, accompanied by anxiety and shame.

Dietary restrictions escalate over time, and may come to include the elimination of entire food groups and involve progressively more frequent and/or severe “cleanses” (partial fasts) regarded as purifying or detoxifying. This escalation commonly leads to weight loss, but the desire to lose weight is absent, hidden or subordinated to ideation about healthy food.

\*Dietary practices may include the use of concentrated “food supplements.”

\*\*Exercise performance and/or fit body image may be regarded as an aspect or indicator of health.

**Criterion B.** The compulsive behavior and mental preoccupation becomes clinically impairing by any of the following:

Malnutrition, severe weight loss or other medical complications from restricted diet

Intrapersonal distress or impairment of social, academic, or vocational functioning secondary to beliefs or behaviors about healthy diet.

Positive body image, self-worth, identity and/or satisfaction excessively dependent on compliance with self-defined “healthy” eating behavior.

**Moroze, Dunn, Holland, Yager, & Weintraub, (2015)**

**Criterion A:** Obsessional preoccupation with eating “healthy foods,” focusing on concerns regarding the quality and composition of meals. (Two or more of the following.)

Consuming a nutritionally unbalanced diet owing to preoccupying beliefs about food “purity.”

Preoccupation and worries about eating impure or unhealthy foods and of the effect of food quality and composition on physical or emotional health or both.

Rigid avoidance of foods believed by the patient to be “unhealthy,” which may include foods containing any fat, preservatives, food additives, animal products, or other ingredients considered by the subject to be unhealthy.

For individuals who are not food professionals, excessive amounts of time (e.g. 3 or more hours per day) spent reading about, acquiring, and preparing specific types of foods based on their perceived quality and composition.

Guilty feelings and worries after transgressions in which “unhealthy” or “impure” foods are consumed.

Intolerance to other’s food beliefs.

Spending excessive amounts of money relative to one’s income on foods because of their perceived quality and composition.

**Criterion B:** The obsessional preoccupation becomes impairing by either of the following:

Impairment of physical health owing to nutritional imbalances (e.g., developing malnutrition because of an unbalanced diet).

Severe distress or impairment of social, academic, or vocational functioning owing to obsessional thoughts and behaviors focusing on patient's beliefs about "healthy" eating.

**Criterion C:** The disturbance is not merely an exacerbation of the symptoms of another disorder, such as obsessive-compulsive disorder or of schizophrenia or another psychotic disorder.

**Criterion D:** The behavior is not better accounted for by the exclusive observation of organized orthodox religious food observance or when concerns with specialized food requirements are in relation to professionally diagnosed food allergies or medical conditions requiring a special diet.

Recommendation for differential diagnosis (Varga, et al., 2013)

Anorexia nervosa, bulimia nervosa, eating disorder NOS.

Obsessive–compulsive disorder.

Schizophrenia.

Paranoia (poisoning).

Hypochondria.

Healthy anxiety.

Somatization.



## Appendix B

### The Bratman Test for Orthorexia-Orto-15

N	Question	Always	Often	Sometimes	Never
1	When eating, do you pay attention to the calories of the food?	O	O	O	O
2	When you go in a food shop do you feel confused?	O	O	O	O
3	In the last 3 months, did the thought of food worry you?	O	O	O	O
4	Are your eating choices conditioned by your worry about your health status?	O	O	O	O
5	Is the taste of food more important than the quality when you evaluate food?	O	O	O	O
6	Are you willing to spend more money to have healthier food?	O	O	O	O
7	Does the thought about food worry you for more than three hours a day?	O	O	O	O
8	Do you allow yourself any eating transgressions?	O	O	O	O
9	Do you think your mood affects your eating behavior?	O	O	O	O
10	Do you think that the conviction to eat only healthy food increases self-esteem?	O	O	O	O
11	Do you think that eating healthy food changes your life-style (frequency of eating out, friends, ...)?	O	O	O	O
12	Do you think that consuming healthy food may improve your appearance?	O	O	O	O
13	Do you feel guilty when transgressing?	O	O	O	O
14	Do you think that on the market there is also unhealthy food?	O	O	O	O
15	At present, are you alone when having meals?	O	O	O	O

For scoring information see Table 3.

For the cut-off values consult Table 4.

## Appendix C

### B-ORA Burda-Orthorexia-Risk-Assessment

Please provide your thoughtful and honest answer to each question

SCORES

**1. If I eat even a small amount of unhealthy food, I am worried I will get sick**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**2. I often feel nauseous when I eat food that I didn't prepare because I don't know for certain the food's nutritional content**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**3. I have trouble falling asleep because I am thinking about upcoming food choices**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**4. I am utterly disgusted when I am around foods I believe to be unhealthy**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**5. R: I don't mind eating something I consider unhealthy**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**6. Limiting my diet to just the healthiest foods makes me feel superior to others**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**7. If I eat even a small amount of food that is not healthy, I feel tired, have headaches and feel unwell.**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**8. R: I will not eat at restaurants whose menu items are consistent with my eating preferences**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**9. Eating exclusively healthy foods makes me a good person**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

B-ORA  
Burda-Orthorexia-Risk-Assessment

Please provide you thoughtful and honest answer to each question

**10. I feel badly about myself but thinking about my diet improves my mood**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

SCORES

**11. I spend most of my day thinking about how healthy my food choices have been**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

**12. I cannot go to sleep without thinking about and planning tomorrows meals**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

**13. My diet is superior to the eating habits of other people**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

**14. R: I buy foods that are less healthy if there are no other choices**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

**15. I cannot understand people that eat "junk food" or anything that is unhealthy**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

**16. I feel terrible and disgusted with myself when I eat something that might not be perfectly healthy**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

**17. R: The thought of gaining weight terrifies me more than the thought of my food being unhealthy**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

**18. I judge people's character by their eating habits**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

B-ORA  
Burda-Orthorexia-Risk-Assessment

Please provide you thoughtful and honest answer to each question

SCORES

**19. Eating out, I cannot stop worrying about the quality of the food I just ate**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**20. Most of the day I think about what I am going to eat next**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**21. R: I feel that straying from my healthy diet is perfectly alright every now and then**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**22. I think that people not eating healthy are ignorant**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**23. I love my diet but I feel isolated because of it.**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**24. I get worried and apprehensive when I think about the unhealthy ingredients in my foods**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**25. When someone asks me to go out to eat, I start feeling anxious because I worry about having to make excuses to not eat unhealthy foods**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**26. R: I eat foods that are less healthy if there are no other choices**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**27. I am worried sick that there might be unhealthy ingredients in my foods**

☐ strongly agree    ☐ somewhat agree    ☐ somewhat disagree    ☐ strongly disagree

☐

**Combined  
Total Score:**

Page 3 Total Scores:

## Scoring Instructions

All questions **Except** Questions marked with an "**R**"

Strongly Agree = 1  
Somewhat Agree = 2  
Somewhat Disagree = 3  
Strongly Disagree = 4

All questions Questions marked with an "R" are NOT scored

Strongly Agree = 0  
Somewhat Agree = 0  
Somewhat Disagree = 0  
Strongly Disagree = 0

The B-ORA explores Orthorexic tendency on a spectrum. The highest total score is 84 and the lowest score is 21.

A higher score indicates less Orthorexic tendencies, while a low score indicates higher Orthorexic tendencies. the questions marked with an "R" are reversed coded and provide cognitive stop signs for the participant to avoid automatic engagement and are not scored. The B-ORA was designed to facilitate exploration into healthy eating related practices and was developed for University student populations within the US. For Information concerning the B-ORA, including copyright, use for commercial and none commercial purposes, please contact:

Lilo Burda

e-mail: lilo41@gmail.com

## **APPENDIX D**

### **Demographic Questions of the B-ORA**

1. What is your gender identity
2. What is your Age
3. What is your Nationality
4. What is your Major of study (degree)
5. Has there been a history of any eating-related issues in your family

## APPENDIX E

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## Appendix F

### Eating Attitudes Test (EAT-26)<sup>®</sup>

Instructions: This is a screening measure to help you determine whether you might have an eating disorder that needs professional attention. This screening measure is not designed to make a diagnosis of an eating disorder or take the place of a professional consultation. Please fill out the below form as accurately, honestly and completely as possible. There are no right or wrong answers. All of your responses are confidential.

#### Part A: Complete the following questions:

1) Birth Date	Month: <input type="text"/>	Day: <input type="text"/>	Year: <input type="text"/>	2) Gender:	Male <input type="checkbox"/>	Female <input type="checkbox"/>
3) Height	Feet : <input type="text"/>	Inches: <input type="text"/>				
4) Current Weight (lbs.):	5) Highest Weight (excluding pregnancy): <input type="text"/>					
6) Lowest Adult Weight:	7) Ideal Weight: <input type="text"/>					

#### Part B: Check a response for each of the following statements:

	Always	Usually	Often	Some times	Rarely	Never
1. Am terrified about being overweight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Avoid eating when I am hungry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Find myself preoccupied with food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Have gone on eating binges where I feel that I may not be able to stop.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Cut my food into small pieces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Aware of the calorie content of foods that I eat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Feel that others would prefer if I ate more.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Vomit after I have eaten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Feel extremely guilty after eating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Am preoccupied with a desire to be thinner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Think about burning up calories when I exercise.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Other people think that I am too thin.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Am preoccupied with the thought of having fat on my body.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Take longer than others to eat my meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Avoid foods with sugar in them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Eat diet foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Feel that food controls my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Display self-control around food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Feel that others pressure me to eat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Give too much time and thought to food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Feel uncomfortable after eating sweets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Engage in dieting behavior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Like my stomach to be empty.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Have the impulse to vomit after meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Enjoy trying new rich foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### Part C: Behavioral Questions:

In the past 6 months have you:

	Never	Once a month or less	2-3 times a month	Once a week	2-6 times a week	Once a day or more
A Gone on eating binges where you feel that you may not be able to stop? *	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B Ever made yourself sick (vomited) to control your weight or shape?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D Exercised more than 60 minutes a day to lose or to control your weight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E Lost 20 pounds or more in the past 6 months	Yes <input type="checkbox"/>		No <input type="checkbox"/>			

\* Defined as eating much more than most people would under the same circumstances and feeling that eating is out of control

© Copyright: EAT-26: (Garner et al. 1982, *Psychological Medicine*, 12, 871-878); adapted by D. Garner with permission.



**EAT-26 SCORE**

	<b>Scoring System for the EAT-26</b>					
	<b>Always</b>	<b>Usually</b>	<b>Often</b>	<b>Sometimes</b>	<b>Rarely</b>	<b>Never</b>
Score for questions 1-25	3	2	1	0	0	0
Score for question # 26	0	0	0	1	2	3

Add the scores for each item together for a total score.

## **Appendix G**

### **Consent Form**

#### **CONSENT FORM**

Development and validation of an inventory, measuring dietary attitudes of healthy eating and Orthorexia Nervosa.

#### **Introduction**

The purpose of this form is to provide you information that may affect your decision as to whether or not to participate in this research study. If you decide to participate in this study, this form will also be used to record your consent.

You have been asked to participate in a research project studying unhealthy eating habits surrounding the desire to follow a healthy diet. The purpose of the research is to utilize current proposed diagnostic criteria and literature concerning Orthorexia Nervosa (ON) to create a survey instrument exploring participants' behaviors, emotions, and thoughts surrounding their dietary habits in an attempt to provide additional data clinicians might use to understand the underlying motivation of ON. The data gathered from this study could be used to further validate and/or revise the proposed diagnostic criteria of ON, providing clinicians and student services personnel with additional information to address eating disorder symptomatology. You were selected to be a potential participant because you are a student at Texas A&M University –Corpus Christi.

#### **What will I be asked to do?**

If you agree to participate in this study, you will be asked to click on the link provided to access the online survey. Only after reading and agreeing to the informed consent will you have access to the assessment. The survey has five parts (1) informed consent; (2) demographics (general information); (3) The Burda-Orthorexia Risk Assessment (B-ORA); (4) the Orto-15 assessment and (5) the EAT-26 assessment. This survey will take approximately 50 to 60 minutes to complete.

You are free to enter the drawing for one of ten \$50.00 Visa gift cards once you completed the survey

#### **What are the risks involved in this study?**

The risks associated with this study are possible psychological distress upon gaining insight into your current relationship with food. The risks associated in this study are minimal and are not greater than risks ordinarily encountered in daily life. If needed, please contact the Texas A&M University-Corpus Christi Counseling Center and set up an appointment with a counselor to address any issues that might have surfaced at (361) 825-2703. The University Counseling Center provides short-term counseling and psychiatric services, skills training and workshops to help students with various issues. Additionally, you can utilize the 211 directory services via phone online to discuss further services and referrals available to them to address any discomfort or psychological distress. You can utilize the 211 directory services (independent from your location within the US) to attain additional referrals to needed resources to address psychological distress.

#### **What are the possible benefits of this study?**

The possible benefits of participation are the opportunity to gain insight into your thoughts and behaviors

connected to your current diet habits, and you may discover that you need help in addressing certain aspects concerning your relationship with food.

### **Do I have to participate?**

No. Your participation is voluntary. You may decide not to participate or to withdraw at any time without your current or future relations with Texas A&M University-Corpus Christi being affected.

### **Who will know about my participation in this research study?**

This study is anonymous, and your anonymity is guaranteed by using an anonymous link to connect you to the survey interface, and no personally identifying data is collected at any point.

No identifiers linking you to this study will be included in any report that might be published. Research records will be stored securely, and only the primary researchers, Lilo Burda (lburda@islander.tamucc.edu), and Dr. Joshua C. Watson (joshua.watson@tamucc.edu) will have access to the data records.

### **Whom do I contact with questions about the research?**

If you have questions regarding this study, you may contact the principal researcher, Lilo Burda via email (lburda@islander.tamucc.edu). You should receive an answer within 24 hours of your initial request. You may request a personal meeting appointment via e-mail.

### **Whom do I contact about my rights as a research participant?**

This research study has been reviewed by the Research Compliance Office and/or the Institutional Review Board at Texas A&M University-Corpus Christi. For research-related problems or questions regarding your rights as a research participant, you can contact Caroline Lutz, Research Compliance Officer at Texas A&M University-Corpus, at (361) 825-2497 or [caroline.lutz@tamucc.edu](mailto:caroline.lutz@tamucc.edu).

### **Agreement to Participate**

You agree to participate in the study by completing the following survey. Participants must be 18 years of age or older. The survey will only be accessible if you agree; otherwise PLEASE CLOSE YOUR BROWSER NOW to exit the system. Thank you.

YOU CAN ENTER THE DRAWING FOR ONE OF THE EIGHT \$50.00 VISA GIFT CARDS UPON FINISHING THE SURVEY

## Appendix H

### IRB Approval



OFFICE OF RESEARCH COMPLIANCE Division of Research, Commercialization and Outreach 6300 OCEAN DRIVE, UNIT 5844  
CORPUS CHRISTI, TEXAS 78412 O 361.825.2497 • F 361.825.2755

Human Subjects Protection Program

Institutional Review Board

APPROVAL DATE:

February 1, 2017

TO:

Lilo Burda

CC:

Dr. Joshua Watson, Dr. Michelle  
Hollenbaugh, Dr. Marvarene Oliver

FROM:

Office of Research Compliance  
Institutional Review Board

SUBJECT:

Notification of Exemption

Protocol Number:

HSRP #49-17

Title:

Development and Validation of the Burda-Othorexia  
Risk Assessment (B-ORA) Scale

Review Category:

Qualifies for Exemption

Edward Orona, Ph.D.  
Coordinator, Research Compliance  
Research, Commercialization and Outreach  
Texas A&M University-Corpus Christi  
Phone: 361.825.2892  
E-mail: [edward.orona@tamucc.edu](mailto:edward.orona@tamucc.edu)

## **Appendix I**

### **Permission to use EAT-26**

Thank you for your permission request to reproduce and use the EAT-26. The EAT-26 is protected under copyright; however, all fees and royalties have been waived because it has been our wish for others to have free access to the test.

Please consider this e-mail as granting you permission to reproduce the test for the purpose suggested in your request as long as the EAT-26 is cited properly. The correct citation is: "The EAT-26 has been reproduced with permission. Garner et al. (1982). The Eating Attitudes Test: Psychometric features and clinical correlates. Psychological Medicine, 12, 871-878."

You can download a copy of the scoring instructions and the test on the homepage of the EAT-26 website. If you use the written version of the test, it is recommended that you provide respondents with the link to the EAT-26 website ([www.eat-26.com](http://www.eat-26.com)) so that they can learn more about the test.

Again, thank you for requesting permission to reproduce and use the EAT-26. If you intend on publishing your work, please send me your results so that they can be included in a research database being developed on the EAT-26 website ([www.eat-26.com](http://www.eat-26.com)).

Best wishes,

David M. Garner, Ph.D.  
Administrative Director  
River Centre Clinic  
5465 Main Street  
Sylvania, OH 43560  
[dm.garner@gmail.com](mailto:dm.garner@gmail.com)