ORTHOREXIA NERVOSA: REAL CONSTRUCT OR NEWEST SOCIAL TREND?

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ERIN MICHELLE MCINERNEY-ERNST

B.A., University of Texas at Austin, 2003
M.A., University of Missouri-Kansas City, 2008

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ORTHOREXIA NERVOSA: REAL CONSTRUCT

OR NEWEST SOCIAL TREND?

Erin Michelle McInerney-Ernst, Candidate for the Doctor of Philosophy Degree

University of Missouri-Kansas City, 2011

ABSTRACT

Despite a plethora of anecdotal evidence, there are very few empirical studies on orthorexia nervosa, which has been described as an obsession with proper nutrition and the consumption of healthy food. Accordingly, the purpose of this study was to begin to explore the epidemiological contours of orthorexia nervosa in an American college student sample and the validity of orthorexia nervosa as a psychological construct. Specifically, this study evaluated the potential overlap between orthorexia nervosa and existing DSM disorders to which it has been compared in the emerging literature. Data included self-reported responses to paper and pencil questionnaires from 163 study participants. The results of this study did not confirm risk factors identified by the few previous ON studies. In addition, the findings from this study indicated that ON shares important characteristics with established eating disorders. However, more research is

needed to determine if ON is a distinct construct, involves constructs not assessed in this study, or simply a societal trend.

APPROVAL PAGE

The faculty listed below, appointed by the Dean of the College of Arts and Sciences have examined a dissertation titled “Orthorexia Nervosa: Real Construct or Newest Social Trend?,” presented by Erin Michelle McInerney-Ernst, candidate for the Doctor of Philosophy degree, and certify that in their opinion it is worthy of acceptance.

Supervisory Committee

Lisa Terre, Ph.D., Committee Chair
Department of Psychology

Jared Bruce, Ph.D.
Department of Psychology

Diane Filion, Ph.D.
Department of Psychology

Jennifer Lundgren, Ph.D.
Department of Psychology

Ravi Sabapathy, Psy.D.
Shawnee Mission Medical Center

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CHAPTER 1

INTRODUCTION

Obesity is currently one of the most prevalent health concerns in the United States. The number of individuals in America who are considered overweight (BMI $\geq$ 25), obese (BMI $\geq$ 30) and extremely obese (BMI > 40) has been increasing over the past decades (NIH, 2000). In the wake of this obesity epidemic, a cultural shift has begun, which emphasizes establishing healthy eating habits as one method of achieving weight loss (Bosi, Camur, & Güler, 2007; Mathieu, 2005). Many would argue that this shift toward one important aspect of healthy living is a positive outcome of the obesity epidemic. However, in recent years, some clinicians have reported anecdotal evidence suggesting that a subset of the population may be taking healthy eating habits too far, possibly leading to adverse physical, psychological, and social consequences (Korinth, Schiess, & Westenhoefer, 2009).

Origins of Orthorexia Nervosa

As originally conceptualized by Bratman (2000), the term orthorexia nervosa (ON) was coined to describe a "fixation on eating healthy food" (p. 9) and obsession for proper nutrition. Currently, only Bratman's general description of ON exists and no formal operational definition with corresponding psychological diagnostic criteria has been proposed. Although Bratman (2000) contends that ON is a type of eating disorder

where the focus is on food *quality* rather than *quantity*, previous research indicates that this is not always the case. In fact, some individuals with eating disorders do demonstrate concern about the types of food they will allow themselves to eat (Affenito, Dohm, Crawford, Daniels, & Striegel-Moore, 2002; Fernstrom, Weltzin, Neuberger, Srinivasagam, & Kaye, 1994; Kummer, Dias, & Teixeira, 2008; Misra et al., 2006; Sunday & Halmi, 1996). In addition, at this time, it has yet to be empirically investigated if ON symptoms cause significant clinical impairment or distress to the individual, although, based on personal experience, Bratman posits that ON can be considered a psychological disorder due to the detrimental physical, psychological, and social effects on the individual over time.

Purported Physical Consequences of ON

Important negative physical consequences of ON have been argued to result from the strict dietary regimens that individuals with this eating pattern follow. For instance, individuals thought to suffer from ON may refrain from consuming specific food groups that they may feel are harmful to their ideal diet or that they consider "impure" or imperfect in some way. To the extent that this extreme eating style omits important food groups, nutritional and mineral deficiencies may occur over time, which can be harmful to individuals' health (Bosi et al., 2007; Bratman, 2000). Although currently there are no empirical studies on potential long-term physical consequences of ON, Bratman cites anecdotal cases in which he believes nutritional deficiencies related to ON may have been associated with adverse medical outcomes (Bratman, 2000).

Purported Psychological Consequences of ON

Psychological consequences associated with ON also have been posited. Individuals may devote much of their time to planning, organizing, purchasing, and preparing foods that they consider pure and healthy. They may feel the need to punish themselves with increasingly stringent dietary restrictions if they violate a personal food rule by consuming "bad" or "wrong" foods. Some individuals may feel that adhering to a perfect diet will help them to achieve a sense of personal purity or perfection. Individuals with ON describe their symptoms as an overwhelming obsessive desire to feel pure, natural, and healthy that begins to override other pleasurable aspects of life (Bratman, 2000; Mathieu, 2005).

Purported Social Consequences of ON

Important social consequences also have been noted. Specifically, individuals thought to suffer with ON often experience social isolation as a result of their lifestyle. For example, individuals with this lifestyle may feel the need to bring their own foods which meet their idealized dietary regimen. In some cases, individuals may decide not to eat with others as a result of their determination to eat only certain types of food. They may begin to feel a morally superior attitude about their food choices, thus increasing social isolation from others who do not understand the overwhelming connection food has with these individuals' self-concept (Bratman, 2000; Mathieu, 2005).

As a result of ON's purported negative physical, psychological, and social consequences, Bratman (2000) has suggested that this eating style be considered a unique

psychological disorder. However, research on ON is extremely recent and the development of this construct is still in its infancy. Although a handful of empirical studies have recently appeared in the literature, more research is needed in order advance the understanding of ON and its possible relationship to existing psychological constructs.

Conflicting Conceptualization of ON

Few studies have focused on determining whether ON is a unique disorder or if it is simply the renaming of an existing disorder. In the initial development of ON, Bratman (2000) argued that ON is best categorized as a unique form of eating disorder. As the research on ON has progressed, researchers and clinicians have raised questions about whether ON truly is a unique disorder or a variant of a current disorder, such as an eating or anxiety disorder (Mathieu, 2005).

ON and Eating Disorders

If ON is not a unique disorder, the debate remains about how to best conceptualize this construct. To date, no empirical studies have been conducted on this issue; however, some clinicians (Bratman, 2000; Mathieu, 2005) contend that rather than being a unique disorder, ON is simply a variant of an eating disorder. Bratman (2000) argues that ON and eating disorders share many similarities but that ON also differs from existing eating disorders in other ways.

In terms of similarities between ON and established eating disorders, Bratman (2000) has argued that, just as in Anorexia Nervosa (AN), individuals coping with ON

become so focused on controlling their eating habits that their life can become unbalanced and they may lose perspective about their eating behaviors. Bratman (2000) further argues that the overlap between both disorders also can be seen in the chronic nature of each disorder. In addition, ON and AN are believed to share the characteristics of a genetic predisposition for perfection, high anxiety levels, and a need to control the environment (Fidan, Ertekin, Isikay, & Kirpinar, 2010; Mathieu, 2005). Others have argued that the potential overlap between the two types of disorders can be seen in that individuals with ON often prefer starvation over consuming foods that they consider "impure" (Donini, Marsili, Graziani, Imbriale, & Cannella, 2004).

However, it is noteworthy that although these surface characteristics may suggest some overlap between AN and ON, according to specific *Diagnostic and Statistical Manual of Mental Disorders-IV-TR* (*DSM-IV-TR*) criteria, a diagnosis of eating disorders involves important additional criteria, such as low weight, compensatory behaviors, and amenorrhea (American Psychiatric Association, 2000). As a result, some researchers (Mac Evilly, 2001) have suggested that rather than classifying ON as an eating disorder, it is more appropriately considered a risk factor for future eating disorders. From this perspective, if ON is not appropriately addressed, this disordered eating pattern may eventually develop into a full eating disorder over time.

However, Bratman (2000) also notes two main differences between ON and eating disorders. First, he erroneously argues that the biggest difference between ON and eating disorders is that individuals with ON focus on food *quality*, while individuals with other eating disorders are more concerned with food *quantity.* However, previous

research indicates that this is not always the case. In fact, some individuals with eating disorders do have individualized rules about which foods they will allow themselves to consume (Affenito et al., 2002; Fernstrom et al., 1994; Kummer et al., 2008; Misra et al., 2006; Sunday & Halmi, 1996).

Bratman has argued that another important difference between ON and eating disorders focuses on motivation. Specifically, he contends that by contrast to AN, where the motivation is for weight loss, individuals with ON are driven instead by a need to achieve a sense of personal perfection or purity (Bratman, 2000; Mathieu, 2005). However, recent research has suggested that these motivations, especially that of reaching perfection, are also present in individuals with AN (Joiner, Heatherton, & Keel, 1997; Lee, 2001; Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2006; Shafran, Cooper, & Fairburn, 2002).

Adding to Bratman's (2000) original arguments, results from recent studies regarding prevalence rates of ON suggest that gender ratio differences between the two disordered eating patterns exist. Both AN and another eating disorder, Bulimia Nervosa (BN), are more prevalent in females (Cartwright, 2004; Fairburn, Cooper, Shafran, & Wilson, 2008). By contrast, the limited research on potential ON gender differences raises the possibility that ON may be more prevalent in males (Aksoydan & Camci, 2009; Donini et al., 2004; Fidan et al., 2010). However, it is noteworthy that research on another form of eating disorder, Binge-Eating Disorder (BED), also has found that, like ON, rates of BED may be higher in males (Barlow, 2008). In sum, although Bratman (2000) argues that ON should be classified as a type of eating disorder, the present

conclusion rests more on opinion and anecdotal evidence rather than on empirical findings.

ON and Anxiety Disorders

Another argument, based on anecdotal evidence, contends that ON may be better conceptualized as an anxiety disorder, specifically as a variant of Obsessive-Compulsive disorder (OCD; Bratman, 2000; Mathieu, 2005). Bratman (2000) describes what he considers as obsessive adherence to strict dietary requirements in ON, such as feeling compelled to bring food to meals, carefully weighing and measuring all foods consumed, detailing and engaging in extreme planning of meals, experiencing accompanying guilt when deviating from personal dietary restrictions, and a general preoccupation with food. Other clinicians (Mathieu, 2005) point to the overlap of anxiety and perfection in ON, which they argue are common elements of OCD. From this perspective, the self-imposed food restrictions of ON are thought to reduce food-related anxiety that is driven by the current cultural emphasis on establishing healthy lifestyle patterns. In people thought to have ON, the obsessive component of OCD emphasizes "pure" eating habits (Mathieu, 2005).

Proponents of conceptualizing ON as a form of OCD point to limited empirical evidence from a few studies that argue that anxiety, a need for control, and striving for perfection are all important components in both ON and OCD (Donini et al., 2004; Kinzl, Hauer, Traweger, & Kiefer, 2006). However, it is noteworthy that according to specific *DSM-IV-TR* (2000) criteria, an official diagnosis of OCD involves other important

criteria, a few of which include bizarre obsessions which the individual realizes are excessive and repetitive behaviors to suppress the thoughts. Clearly, at this time, additional studies are needed to help determine if ON is truly a unique disorder or better characterized as an existing psychological disorder.

In summary, the precise nature of ON is unclear. Based largely on anecdotal evidence, some clinicians have argued that ON is a unique form of eating disorder while others assert that it is simply one form of obsessions found in OCD. It could also be argued that ON may not be a psychological disorder, but simply a societal trend. Clearly, much is left to understand about this complex issue and more research is needed in order to further elucidate the precise nature of ON.

Construct & Diagnostic Validation Process

Fortunately, there is a well-developed scientific methodology for addressing controversies about psychological constructs. Because psychological constructs are unable to be observed directly, preliminary construct development involves evaluating correlational relationships between multiple measurements of the construct. An early discussion regarding the process of evaluating the existence of psychological constructs was outlined by Campbell and Fiske (1959) in which they discussed the importance of developing constructs through the use of multiple forms of measurement and by examining two important forms of validity: convergent and discriminant.

Campbell and Fiske (1959) offered the following description of convergent validity, “measures of the same trait should correlate higher with each other than they do

with measures of different traits involving separate methods" (p. 104). Thus, if a newly proposed psychological construct is legitimate, then different methods of measuring the construct should be more correlated with each other than with measures of different constructs. A strong correlation between different measures of two similar constructs demonstrates convergent validity and suggests that the constructs are related.

On the other hand, it is also important that proposed psychological constructs be distinct from other existing constructs, from which they should differ. Campbell and Fiske (1959) describe discriminant validity in this way, "…the validity values should be higher than the correlations among different traits measured by the same method" (p. 104). In other words, when the proposed psychological construct demonstrates limited correlation or overlap with measures of different constructs, it is inferred that the two constructs are indeed distinct from each other. It is important that a balance of convergent and discriminant validity be demonstrated through the use of multiple forms of measurement when evaluating the possible existence of a psychological construct (Campbell & Fiske, 1959).

Once sufficient convergent and discriminant validity of a proposed psychological construct has been established, an important subsequent step involves establishing diagnostic validity. Robins and Guze (1970) first developed a well-defined methodology that has become the gold standard for establishing diagnostic validity. This broad process of evaluating the legitimacy of a proposed psychological construct as a potential diagnosis involves the evaluation of five important criteria: clinical description,

laboratory studies, delimitation from other disorders, follow-up studies, and family studies (discussed in detail below).

Only after a psychological construct has been developed and diagnostic validity has been determined, can it be considered as a possible psychological diagnosis. Building on and applying the five step system developed by Robins and Guze (1970), a separate set of criteria have been proposed to help determine if psychiatric diagnoses should be added or removed from subsequent versions of the DSM (Blashfield, Sprock, & Fuller, 1990; Kendall & Jablensky, 2003). According to Blashfield and colleagues (1990), a diagnostic category should be included in the DSM-IV-TR only when five important criteria have been met. First, there should be at least 50 journal articles published on the proposed category during the previous 10 years. In addition, the literature should include a proposed set of diagnostic criteria for the disorder and at least two empirical studies by independent research groups should have interclinician agreement levels of .70 or greater. Also, at least two empirical studies by independent researchers should demonstrate that if an individual meets one diagnostic criterion, there is at least a .50 probability that the same individual also will meet a second diagnostic criterion. Finally, there should be at least two independent empirical studies that show that the proposed diagnostic criteria are differentiated from that of similar diagnoses. By using the criteria proposed by Blashfield and colleagues (1990), diagnostic categories are likely to be informed by a strict scientific method, helping to ensure the validity of psychological diagnoses.

Applying the Diagnostic Validity Criteria to ON

Clearly, the process of determining both construct and diagnostic validity is extensive, often taking many years of research, and involves more than simply using anecdotal evidence to describe a potential psychological construct. The best way to conceptualize ON has been debated in previous literature but one thread of consistency has been that some clinicians feel that it may be a legitimate psychological concern for a portion of the overall population. Applying the process developed by Robins and Guze (1970) to the development of ON in comparison to other eating and anxiety disorders highlights the gaps in ON research. A graphical representation of how this process applies to eating disorders, anxiety disorders, and ON is included in Appendix A.

Step 1: Clinical description.

The first step in establishing diagnostic validity is to describe the clinical picture of the proposed construct. This description is developed by identifying symptom profiles, demographic characteristics (i.e. race, sex, age of onset), and typical precipitants to the development of the proposed psychological construct (Kendall & Jablensky, 2003; Robins & Guze, 1970). A plethora of epidemiological studies have been conducted for eating and anxiety disorders.

Eating disorders.

The clinical descriptions of both Anorexia Nervosa (AN) and Bulimia Nervosa (BN) have been included in the DSM-IV-TR (2000), while Binge Eating Disorder (BED) has been developed more recently through psychological studies. AN is characterized by

decreased body weight as a result of an overwhelming desire to be thin and an intense fear of obesity. This dramatic weight loss is primarily achieved through caloric restriction independently or combined with purging behaviors (Barlow & Durand, 2009). Approximately 90% of AN diagnoses occur in females, who live in industrialized societies, and symptoms typically begin in mid- to late-adolescence (ages 14-18 years). The lifetime prevalence rate of AN in females is approximately 0.5% and is $1/10^{th}$ of that for males (Barlow, 2008; DSM-IV-TR, 2000).

BN is characterized by feelings of a loss of control when eating a substantial amount of food, or more food than would be typical for most people (Fairburn, Cooper, & Cooper, 1986). As a result the individual attempts to compensate for eating a large amount of calories by purging, in an effort to prevent potential subsequent weight gain (Barlow & Durand, 2009). As with AN, approximately 90% of BN cases are Caucasian females, who are of middle- to upper-middle socioeconomic status. BN most commonly begins during late adolescence or early adulthood with lifetime prevalence rates of 1-3% for females and $1/10^{th}$ of that for males (Barlow, 2008; DSM-IV-TR, 2000; Striegel-Moore & Franko, 2003).

Contrary to AN and BN, BED is not included as an eating disorder in the DSM-IV-TR (2000) but is listed as a potential new disorder that requires further study (Barlow & Durand, 2009). Some studies have suggested that there is enough evidence to conclude that BED should be included as a separate eating disorder in subsequent versions of the DSM (Bulik, Sullivan, & Kendler, 2000). In addition, a substantial number of studies have evaluated the clinical description of BED and its epidemiological

factors. BED is characterized by distress due to binge eating that does not include compensatory behaviors (Barlow & Durand, 2009; Spitzer et al., 1991). Recently, the epidemiological factors underlying BED have begun to be understood. It is estimated that 2-3% of the general population may have BED (Lilenfeld, Ringham, Kalarchian, & Marcus, 2008). In contrast to other eating disorders, 1/3 of the cases of BED occur in middle-aged men (Barlow, 2008). No definite conclusions can be made at this time regarding which ethnic groups are more likely to develop BED, as more research is needed in this area (Striegel-Moore & Franko, 2003). In addition, BED rates are thought to increase with age (Johnson, Spitzer, & Williams, 2001). Gender differences in BED have also been found, with one community sample indicating that 2.8% of females and 1.9% of males met the criteria for BED (Spitzer et al., 1992). An important reporting bias in BED symptoms may exist as previous research suggests that men report feeling less distress about binge eating and engage in fewer compensatory behaviors after binging than females (Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002).

Anxiety disorders.

In addition to eating disorders, the clinical description and epidemiological factors of anxiety disorders, particularly Generalized Anxiety Disorder (GAD) and Obsessive-Compulsive Disorder (OCD), also have been extensively studied. GAD is characterized by a broad, chronic, excessive worry and anxiety on most days for at least 6 months (DSM-IV-TR, 2000). Typically, the majority of the individual's anxiety is focused on minor, everyday life events (Barlow & Durand, 2009). GAD is one of the most common

forms of anxiety disorders with lifetime prevalence rates ranging from 5 to 5.7% in the general population (Barlow, 2001; DSM-IV-TR, 2000; Kessler, Berglund, Demler, Jin, & Walters, 2005). Approximately 2/3 of individuals with GAD symptoms are females and over half of individuals report that their symptoms began during childhood or adolescence (DSM-IV-TR, 2000). GAD has been found to occur in 2.9% of college students with females twice as likely to report symptoms as males (Eisenberg, Gollust, Golberstein, & Hefner, 2007).

Empirical evidence regarding the clinical description of OCD also has been developed. According to the DSM-IV-TR (2000), OCD is characterized by two important components that interfere with daily functioning: "persistent ideas, thoughts, impulses, or images that are experienced as intrusive and inappropriate and cause marked anxiety or distress" (obsessions) and "repetitive behaviors or mental acts of which the goal is to prevent or reduce anxiety or distress" (compulsions; p.457). The lifetime prevalence rates for OCD have been estimated to be 1.6% (Kessler et al., 2005) in the community population with some reports of rates as high as 2.3% (DSM-IV-TR, 2000). The age of onset for OCD ranges from childhood to 30 years old, with a median age of 19 (Kessler et al., 2005). Also, there are gender differences in the age of onset. For males, OCD symptoms typically begin between the ages of 13 and 15 years while females typically report OCD beginning between the ages of 20 and 24 years (Rasmussen & Eisen, 1990). In addition, slightly more than half of adults with OCD are female (Karno & Golding, 1991; Rasmussen & Tsuang, 1986).

ON.

By contrast to the numerous studies describing the clinical picture of eating and anxiety disorders, ON studies are relatively recent. At this point, a full clinical description and diagnostic criteria have yet to be developed (Appendix A). In addition, the few existing ON studies identifying epidemiological factors present conflicting conclusions. A full review of the current ON literature regarding epidemiological factors (gender, age, obesity level, education level, marital status, number of children, and lifestyle factors) is presented in Chapter 2. Although developing a clinical description has been the focus of ON studies, the present research has only begun to scratch the surface on this step and more studies are needed in order to develop a clearer clinical picture of ON as a proposed psychological construct.

Step 2: Laboratory findings.

The second phase of determining diagnostic validity of a proposed psychological construct is to examine correlates from laboratory findings. These findings may include radiological results, well-validated and reliable psychological tests, or postmortem studies, when applicable (Kendall & Jablensky, 2003; Robins & Guze, 1970). Recently, it has been suggested that biologically-focused laboratory findings (e.g. molecular genetics, neurochemistry, neurophysiology, and cognitive neuroscience) also be included in this step to add to the process of establishing diagnostic validity (Andreasen, 1995).

Eating disorders.

A plethora of laboratory findings exist for eating disorders, particularly regarding physical conditions that correlate with AN and BN. For instance, a few of the more notable physical markers of AN include emaciation, lanugo, anemia, low serum estrogen levels in females, heart arrhythmia, dehydration, severe hypotension, and yellowing of the skin (DSM-IV-TR, 2000). Some of the physical conditions correlated with BN overlap with those of AN, but also include electrolyte abnormalities, metabolic acidosis, mildly elevated levels of serum amylase, damage to dental enamel, cardiac arrhythmias, menstrual irregularity, esophageal tears, and rectal prolapse, to name a few (DSM-IV-TR, 2000). The physical correlates of BED are still being developed in the research but primarily include higher obesity level, diabetes, limb or joint pain, headaches, gastrointestinal problems, menstrual issues, chest pain, and shortness of breath (Barlow & Durand, 2009; Hudson et al., 2006; Johnson, Spitzer, & Williams, 2001).

In addition, studies on differences in brain structure and function for eating disorders have focused on the role of the hypothalamus and neurotransmitter systems such as norepinephrine, dopamine, and in particular, serotonin (Vitiello & Lederhendler, 2000). For AN specifically, brain imaging studies have found that individuals have an increase in ventricular-brain ratio secondary to starvation (DSM-IV-TR, 2000). Finally, a substantial number of self-reported questionnaires and interviews have been found to be reliable and valid assessments of eating disorder symptoms, most notably the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994), Clinical Impairment Assessment (CIA; Bohn & Fairburn, 2008), PRIME-MD Patient Health

Questionnaire (PHQ; Spitzer et al., 1994), and Eating Disorder Examination (EDE; Fairburn & Cooper, 1993)

Anxiety disorders.

In a similar vein, the laboratory findings for GAD and OCD are also extensive. The physical concerns correlated with GAD and OCD often overlap and can include muscle tension, somatic symptoms (e.g. sweating, nausea, diarrhea), exaggerated startle reflex, mental agitation, vulnerability to fatigue, irritability, sleep concerns, and difficulty focusing attention. Additionally, individuals also may engage in excessive use of alcohol or sedatives, hypnotics, or anxiolytic medications and those with OCD in particular may have dermatological problems due to excessive washing or cleaning (Barlow & Durand, 2009; Brown, Marten, & Barlow, 1995; DSM-IV-TR, 2000). Also, in OCD, increased autonomic activity is noted when the obsession is triggered, followed by a subsequent decrease in physiology when the individual performs the compulsion (DSM-IV-TR, 2000).

Studies looking at brain structure and function have found that individuals with GAD show marked increases of electroencephalogram beta activity which reflects heightened cognitive processing in the frontal lobes, especially in the left hemisphere (Borkovec, Alcaine, & Behar, 2004; Borkovec & Inz, 1990). Brain imaging studies in OCD also have found oddities in deep motor control areas and programmed compulsions in the brain that once activated, develop into a behavioral loop that is difficult to interrupt (Rapoport, 1989; Resnick, 1992; Zimbardo, Johnson, & McCann, 2009). Finally,

multiple questionnaires have been used to test for symptoms of GAD and OCD, a few of which include the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995), Yale-Brown Obsessive Compulsive Scale (YBOCS; Goodman et al., 1989b, 1989a), Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002), and Leyton Obsessional Inventory (Kazarian, Evans, & Lefave, 1977).

ON.

Contrary to the substantial number of laboratory findings for eating and anxiety disorders, the laboratory research on ON is non-existent (Appendix A). To date, no specific unique physical symptoms of ON have been proposed, other than anxiety about food quality and possible nutritional deficits over time (Bratman, 2000). In addition, studies considering brain structure and function in individuals with ON have yet to be conducted. Currently, there are two self-reported questionnaires that have been developed to assess ON symptoms. The psychometric properties of one of these measures have yet to be studied, while the other measure is currently under development. The psychometric properties of both measures are described in more detail in the Measures section of Chapter 3. In conclusion, laboratory findings of ON are needed in order to begin to develop the diagnostic validity of ON.

Step 3: Delimitation from other disorders.

Another important step in developing the diagnostic criteria of a construct is to establish the delimitation of the construct from other disorders. In other words, it is

important to determine that the proposed diagnosis is not better accounted for by another existing disorder. To this end, exclusion criteria must be developed in order to differentiate between the proposed psychological construct and those of other existing disorders that may share superficial diagnostic characteristics (Kendall & Jablensky, 2003; Robins & Guze, 1970).

Eating disorders.

Criteria for differentiating eating disorders from other psychological disorders have been clearly developed. First, given the symptom overlap in eating disorders, it is important that the symptoms of each disorder be specifically differentiated from each other as well as from other disorders. For example, for AN, the primary concern is typically a fear of weight gain. AN is differentiated from other disorders in that the symptoms of AN are not due to any of the following factors: medical concerns or illness, mood disorders, psychosis, obsessions and compulsions unrelated to food, social concerns, or psychological distortion unrelated to body features, shape, or size (DSM-IV-TR, 2000). AN and BN are differentiated from each other because with BN individuals can maintain at least a minimally normal weight. In addition, BN is also differentiated from other disorders because it does not occur within the context of the following: eating changes due to a medical condition, mood disorders, or impulsive behavior due to a personality disorder (DSM-IV-TR, 2000). BED is differentiated from either of these eating disorders primarily because this diagnosis does not include compensatory

behaviors after engaging in a binge eating episode (Striegel-Moore & Franko, 2003; Tanofsky-Kraff & Yanovski, 2004).

Anxiety disorders.

Clear differential diagnoses have also been developed for GAD and OCD. GAD is differentiated from other psychological diagnoses because it does not involve any of the following issues: a reaction to a medical condition or substance use, panic attacks, being embarrassed in public, obsessions and compulsions, fear of gaining weight or having a serious medical illness, symptoms that occur only within the context of a mood disorder or as a reaction to a traumatic life event, or concerns about being separated from a loved one (DSM-IV-TR, 2000). Likewise, OCD can be differentiated from other psychological disorders because it does not involve fears of specific objects or situations, ruminations limited to within the context of mood disorders, anxiety that occurs as a result of a medical condition or substance use, preoccupation with physical symptoms, inability to recognize the excessive nature of obsessions and compulsions, or being preoccupied with perfection or orderliness (Barlow, 2008; DSM-IV-TR, 2000).

ON.

In contrast to the clear differential diagnosis process for eating and anxiety disorders, the research on ON has yet to develop differential criteria or even a formal operational definition of ON (Appendix A). Therefore as a result, the delimitation of ON from other disorders has yet to be established. In fact, as previously discussed, both the

diagnostic validity as well as the unique characteristics of ON that differentiates it from eating and anxiety disorders remains highly debated in the literature (Mathieu, 2005).

Step 4: Follow-up studies.

A fourth criterion proposed by Robins and Guze (1970) for establishing diagnostic validity focuses on long-term assessments of the diagnosis. Specifically, this criterion focuses on establishing the long-term stability of a diagnosis. Longitudinal or follow-up studies are used to determine the diagnostic constancy over time (Kendall & Jablensky, 2003; Robins & Guze, 1970).

Eating disorders.

A plethora of follow-up studies of both AN and BN have been conducted and results from these studies indicate that these disorders are chronic illnesses that last over time, especially if untreated (Barlow & Durand, 2009; Fairburn, Cooper, Doll, Norman, & O'Connor, 2000; Fairburn et al., 2003; Hudson, Hiripi, Pope, & Kessler, 2007; Joiner et al., 1997; Keel & Mitchell, 1997). Results from some follow-up studies have indicated that BED may be phasic rather than chronic and has a relatively better prognosis up to 5 years after diagnosis. However, obesity levels tend to rise over time for individuals with BED (Barlow, 2008; Barlow & Durand, 2009; Fairburn et al., 2000).

Anxiety disorders.

Similarly, many follow-up studies of both GAD and OCD have been conducted, with results suggesting that these psychological disorders are chronic as well. Studies

evaluating symptom persistence of GAD have found relatively high levels of GAD at 2 and even 12 year follow-up periods (Bruce et al., 2005; Yonkers, Warshaw, Massion, & Keller, 1996). In a similar vein, results from longitudinal studies of OCD symptoms also indicate that once it develops, OCD tends to be chronic throughout the lifetime (Eisen & Steketee, 1998; Steketee & Barlow, 2002).

ON.

Contrary to the follow-up studies of eating and anxiety disorders, which indicate diagnostic stability over time, currently, there are no follow-up studies of ON (Appendix A). Longitudinal studies of any duration do not exist, making conclusions about this step of diagnostic validity impossible at this time. As a result of the lack of follow-up studies for ON, no information is known about the possible consistency of ON symptoms over time.

Step 5: Family studies.

The final step outlined by Robins and Guze (1970) in establishing diagnostic validity is to identify family patterns of the proposed psychological construct (Kendall & Jablensky, 2003). They argued that the focus should be on establishing a family pattern regardless of the etiology of the disorder (i.e. heredity or environmental). This final diagnostic validity criterion is focused on finding a pattern of the disorder within families, rather than on specific etiological factors (Robins & Guze, 1970). For eating and anxiety disorders, a plethora of studies indicate that these disorders are present throughout families.

Eating disorders.

Many family studies have been conducted for both AN and BN and results have found that these diagnoses are present in close relatives of an individual diagnosed with an eating disorder. Some studies have found that relatives of an individual with either AN or BN are 4 to 5 times more likely than the general population to develop eating disorders, with female relatives of individuals with AN at a slightly higher risk (e.g. Barlow & Durand, 2009; Hudson, Pope, Jonas, & Yurgelun-Todd, 1983; Scherag, Hebebrand, & Hinney, 2010; Strober, Freeman, Lampert, Diamond, & Kaye, 2000; Vitiello & Lederhendler, 2000). For both AN and BN, an increased risk of developing the disorder is present if a first degree biological relative also has either of the disorders (DSM-IV-TR, 2000). In twin studies, an individual has been found to be at a significantly higher risk of developing AN or BN when their twin has an eating disorder, with this level being highest in monozygotic in comparison to dizygotic twins (DSM-IV-TR, 2000; Kendler et al., 1991; Walters & Kendler, 1995). Similar findings have emerged from the more recent research on BED, demonstrating higher levels of BED in twin studies and finding that BED aggregates strongly in families, independent of obesity (Bulik et al., 2000; Hudson et al., 2006; Lilenfeld et al., 2008; Reichborn-Kjennerud, Bulik, Tambs, & Harris, 2004).

Anxiety Disorders.

In a similar vein, many family studies have been conducted regarding GAD and OCD and results have found that general anxious tendencies tend to be shared within

families (Hettema, Prescott, Myers, Neale, & Kendler, 2005; Merikangas, Avenevoli, Dierker, & Grillon, 1999). For instance, study results have indicated that GAD is often common among family members (Barlow & Durand, 2009; Noyes, Clarkson, Crowe, Yates, & McChesney, 1987; Noyes et al., 1992; Roy, Neale, Pedersen, Mathé, & Kendler, 1995). Twin studies also suggest a link between families and GAD symptoms (DSM-IV-TR, 2000; Kendler, Neale, Kessler, Heath, & Eaves, 1992a). In a similar vein, OCD also has been found to run in families, with results from twins studies lending further evidence of the patterns of OCD within families (Alsobrook, Leckman, Goodman, Rasmussen, & Pauls, 1999; DSM-IV-TR, 2000; Hettema, Neale, & Kendler, 2001; Nicolini, Arnold, Nestadt, Lanzagorta, & Kennedy, 2009; Pauls, Alsobrook, Goodman, Rasmussen, & Leckman, 1995; Van Grootheest, Cath, Beekman, & Boomsma, 2005).

ON.

By contrast to the large literature on family studies for eating and anxiety disorders, no family studies currently exist for ON (Appendix A). The majority of the limited ON literature has focused on individuals thought to have ON symptoms. As a result, currently it is impossible to determine the family contribution of ON, whether genetic or environmental Appendix A).

Limited Diagnostic Validity of ON

In conclusion, a formal operational definition of ON has yet to be developed and the ON literature only has begun to address the necessary steps to establish diagnostic validity. In fact, the few existing ON studies have focused entirely on the first step of

determining diagnostic validity (clinical description), while the current ON literature has yet to address any of the additional four criteria for establishing diagnostic validity (Appendix A). Even within the first step of examining epidemiological factors related to ON, the limited existing ON research only has begun to scratch the surface on identifying possible epidemiological factors related to ON.

CHAPTER 2

LITERATURE REVIEW

The vast majority of ON research has been focused on very limited samples, such as homogeneous groups of medical students, nutritional students, or performance artists, and lacks experimental rigor. However, even in these relatively homogenous samples, results on the prevalence of ON have been highly variable. In particular, there is a lack of cumulative systematic investigation that builds on prior study results. Instead, there is a smattering of studies that have examined an assortment of ON variables. Accordingly, comparing results across studies is extremely difficult.

Efforts to establish prevalence rates of ON have had mixed results. For instance, in a study conducted by Korinth and colleagues (2009), ON symptoms in a group of German university nutrition students were compared to peers who were not pursuing a nutritional degree (n = 219, 195 female, M age range = 22.5 to 25.7 years). While the findings from this study indicated that nutritional students do practice higher levels of dietary restraint than students in other college majors, no statistically significant difference in ON symptoms were found between nutrition students and their peers. However, no prevalence rates of ON were reported in this study so the clinical significance of the findings cannot be determined.

Likewise, another study examining the prevalence rate of ON in a group of Austrian female dietitians (n = 283, M age = 36.2 years) found the following rates of ON: 52.3% had no ON symptoms, 34.9% showed some symptoms of orthorexic behavior, and 12.8% were considered to have ON. Of those individuals with at least some orthorexic behaviors, 8.8% reported having an increase in self-esteem from eating healthy foods, 4.6% felt guilt or self-loathing when not adhering to their diet, 2.5% avoided eating away from home as a result of food fears, 2.5% avoided eating with others, and 1.1% brought their own food with them when eating away from home. The authors of this study suggest that ON is of notable prevalence in individuals who work in dietary and nutritional fields (Kinzl et al., 2006). However, no control group was included in the study so the basis of this conclusion is tenuous at best.

A study conducted by Bosi and colleagues (2007), evaluated potential ON symptoms in a total of 318 Turkish resident medical doctors (149 female, M age range = 27.2 years). The findings from this study indicated that 45.5% of the medical residents included in this study were considered to have ON or to exhibit "highly sensitive behavior" (p. 661) about 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 was 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 to others and having a high level of education about nutrition and healthy lifestyles.

Another preliminary study looked at the relationship between fitness and ON in Sweden and included 251 participants who were involved in fitness activities (166 female, *M* age for men = 28 years, *M* age for women = 32 years). Of these participants 66% of the men and 54% of the women exercised 3-4 times each week. The findings of this study indicated that for females only, higher ON symptoms were found in individuals who exercised more frequently (Eriksson, Baigi, Marklund, & Lindgren, 2008). Although this study is the only known investigation of a possible relationship between exercise level and ON, the findings suggest that there may be an important link between these lifestyle patterns and suggest a direction for future research in identifying possible at-risk populations.

Finally, Aksoydan and Camci (2009) examined ON symptoms in a group of Turkish performance artists. Of the 94 participants (55 female) included in the study, 46.8% were opera singers (*M* age = 38.8 years), 29.8% were ballet dancers (*M* age = 26.8 years), and 23.4% were symphony orchestra musicians (*M* age = 30.0 years). The results of this study found that overall 54.6% of the participants had orthorexic symptoms. The group of performance artists with the highest prevalence of ON, at 81.8%, was opera singers. Furthermore, 32.1% of ballet dancers and 36.4% of symphony orchestra musicians were found to have ON as well, suggesting that this eating pattern may be prevalent in individuals involved in the performing arts. However, overall, the results from these few preliminary studies focused on limited samples of individuals, present highly conflicting findings, and draw tenuous conclusions that are difficult to justify based on their data alone.

Research on ON Risk Factors

Although the majority of the relatively recent research on ON has examined the prevalence of symptoms in limited population subtypes, within these groups, some have sought to elucidate specific demographic variables that may be linked to this eating pattern. Given the relative infancy of research regarding ON, studies looking at these variables are limited and currently provide an insufficient basis on which to draw conclusions. Nevertheless, important demographic variables that may be linked to ON have been hypothesized and preliminarily evaluated by the currently limited research in this area.

Gender

Determining which gender may be at highest risk of developing ON is one of the most common concerns of existing studies. Nearly all of the current studies have evaluated the prevalence rates of ON between genders. Contrary to the broader eating disorder literature in which female prevalence exceeds that of male counterparts, preliminary ON study results seem to indicate that ON may be more prevalent in males. In fact, three of the existing studies have found statistically significant gender differences in ON, with males being more likely to report symptoms than females (Aksoydan & Camci, 2009; Donini et al., 2004; Fidan et al., 2010). However, other research has noted a trend for ON to be more prevalent in women (Bosi et al., 2007; Eriksson et al., 2008). Important potential confounds may have influenced these results, such as the specific cultures that were included in the studies (e.g. Sweden, Italy, and Turkey) and the

educational backgrounds of the participants. More studies are needed in order to generalize these findings.

Age

The existing research on the possible relationship between age and ON also is conflicting. Some research finds that prevalence rates of ON may increase with age (Aksoydan & Camci, 2009; Donini et al., 2004). In contrast, other research has found that the rate of ON was higher for students younger than 21 years old in comparison to older peers (Fidan et al., 2010). Finally, one study (Bosi et al., 2007) failed to find a significant relationship between ON and age. Given these conflicting results, a definite conclusion about the prevalence of ON in different age groups cannot be determined at this time.

Obesity Level

Similarly, results from studies about the possible relationship between body mass index (BMI) and ON also are unclear and definitive conclusions about this relationship have yet to be established. The findings from two studies indicate that there may be a positive correlation between ON and BMI levels, with highest levels of ON being found in individuals who were considered overweight or obese (Aksoydan & Camci, 2009; Fidan et al., 2010).

In contrast, one study (Bosi et al., 2007) found a trend, although not statistically significant, that as BMI level increased, the risk of ON decreased. A final study (Donini et al., 2004) found no differences in BMI levels between individuals considered to have

ON and those individuals without ON symptoms. However, many of these studies were characterized by restricted BMI ranges and other confounds. Future research should include a more diverse sample in regard to BMI level in order to further understand the possible relationship between ON and BMI.

Education Level

Research regarding the possible relationship between education level and ON also presents conflicting findings. A study by Donini et al. (2004) found an inverse relationship between education level and ON, with individuals who had lower education levels more likely to have orthorexia symptoms. Bosi et al. (2007) found a similar trend, although not statistically significant, for higher levels of education to be correlated with fewer orthorexia symptoms. By contrast, Aksoydan and Camci (2009) found a different trend, though not statistically significant, for higher levels of education to be related to more ON symptoms. Clearly, given the conflicting findings from the small number of studies looking at the relationship between education level and orthorexic symptoms, additional studies are needed before definite conclusions can be made.

Marital Status and Number of Children

Only one study has evaluated the possible relationship between ON and marital status or number of children. A study conducted by Donini and colleagues (2004) failed to find a significant relationship between ON and marital status or the presence of children in the family. Nevertheless, the conclusions that can be drawn from one study are extremely tentative and more research is needed.

Lifestyle Factors

Finally, additional research is needed in order to understand the relationship between ON in individuals with different lifestyle characteristics, specifically weight management efforts, smoking, and alcohol consumption. Only one study (Bosi et al., 2007) examined a possible relationship between ON and current attempts at weight control. This study found that individuals who were currently controlling their weight were less likely to have ON.

Other lifestyle factors that have been considered by two studies are smoking and alcohol consumption. Aksoydan and Camci (2009) found a trend, although not statistically significant, for an increased rate of ON in performance artists who did not smoke or drink alcohol regularly. In contrast, Fidan and colleagues (2010) found a trend, although not significant, for fewer ON symptoms in individuals who did not smoke in comparison to rates for smoking peers. Additional research is needed to help clarify the conflicting results of the existing studies that examine the possible relationship between lifestyle factors and ON.

In summary, results from the current studies on epidemiological factors (gender, age, obesity level, education, marital status, number of children, and lifestyle behaviors) associated with ON remain unclear. While the initial studies examining possible factors that may be related to orthorexic symptoms have helped to initiate evaluation of this construct, the research on ON is still in its infancy. It is imperative that specific factors

that may be linked to ON be clarified and studied in greater depth in order to develop a better understanding of this eating pattern.

Overall Summary of ON Literature to Date

There are few existing studies that empirically investigate the currently limited anecdotal evidence of ON. Specifically, there remains a paucity of studies about both the epidemiological factors as well as how to best conceptualize this hypothesized "disorder." Based on the extremely sparse and preliminary nature of the existing data, ON seems to affect men more frequently than women, however; is it too early to draw definite conclusions on potential gender differences in ON. The data on other epidemiological factors is even less clear, with conflicting study findings for the relationship of ON and age, obesity level, education level, marital status, presence of children, and lifestyle factors such as weight control, smoking, and alcohol consumption. Due to limited samples included in these studies, important additional factors have yet to be studied, such as various student educational backgrounds and majors, employment status, socioeconomic status, and ethnic backgrounds.

The existing research has important limitations. First, all of the existing studies involve individuals in either European or Eastern cultures. Consequently, the existing research has yet to include an American sample. Given the current cultural shift toward healthy lifestyles in the United States, it is imperative that the prevalence of ON be examined using an American population.

Also, nearly all of the existing studies have relied on Bratman's (2000) loose conceptualization of ON as a "fixation on eating healthy food" (p. 9) and obsession for proper nutrition that focuses on food quality rather than quantity. None of these studies has sought to expand or refine this interpretation into an operational definition for ON. Also, the majority of these studies have relied on Bratman's (2000) original measure for ON which consisted of approximately ten dichotomous questions as ON indicators. However, another measure is currently under development. As a result of both a lack of a clear operational definition for ON and a reliance on a measure with limited psychometric properties, the results from these studies should be interpreted with caution.

In addition, many of the current studies on ON focus on prevalence rates within very limited populations, such as nutritional or medical students. While it is hypothesized that these groups of individuals may be at a higher risk of developing ON due to their educational training in health and well-being, ON may not be limited to these populations. Therefore, it is imperative that additional research be gathered on a more diverse population, with a wide range of education and socioeconomic levels, in order to develop a clearer understanding of the overall prevalence of ON. In short, important gaps in the research regarding the epidemiology of ON remain.

Finally, there continues to be ongoing debate about if ON is a unique psychological disorder, a form of a current disorder, or simply a behavioral trend. However, as previously discussed, the process of developing construct validity is complex and includes many steps (Robins & Guze, 1970). Currently, the limited ON research only has begun to scratch the surface of the first step in this process and has yet

to begin the last four stages of developing construct validity. Therefore, it is impossible as of yet, to make a conclusion about the nature of this eating pattern. It may be that ON is a form of eating disorder, a form of anxiety disorder, or simply a societal trend. Given the recent cultural emphasis on achieving healthy lifestyles and eating habits in response to a growing obesity epidemic, it is imperative that ON be better understood to help identify a subset of the population that may take a beneficial emphasis on health to an unhealthy extreme.

In an effort to add to the preliminary and currently limited ON research, the goals of this study were modest. It was anticipated that this study would serve as a preliminary step in beginning to better understand the epidemiology of ON and the overall nature of this potential disorder. Although a substantial portion of the process of developing construct validity for ON only recently has begun, it was anticipated that this study would serve as a preliminary step in further advancing knowledge about ON as a potential psychological construct.

Purpose of the Study

Therefore, the purpose of this dissertation research was two-fold:

(1) to establish preliminary demographic characteristics of ON within a United States college student population and (2) to begin to evaluate the validity of ON as a distinct construct by considering the relationship between an ON measure in comparison to psychometrically-established measures of self-reported anxiety concerns, disordered eating patterns, and overall health concern using a US college sample.

Exploratory Hypotheses

All hypotheses were based on the extremely limited existing data and therefore were tentative in nature. The exploratory hypotheses for this study were as follows:

(1A) Demographic factors that will be associated with *significantly higher* ON scores (based on limited studies previously cited), include: male gender, younger age, lower BMI level, lower education level, current weight management attempts, and fewer risky behaviors (smoking and consuming alcohol). Because existing ON studies have yet to examine these factors, based on the overall eating disorder literature, higher socioeconomic status, and Caucasian ethnicity are factors that also are hypothesized to be significantly related to ON scores.

(1B) Demographic variables that will have *no relationship* with ON scores will include: marital status, number of children, and employment status.

(2A) To the extent that superficial similarities exist between GAD and ON, it is expected that there will be some correlational overlap between measurement questionnaires; however, it is anticipated that this correlational trend *will not* be statistically significant.

(2B) ON symptom scores *will not* significantly predict OCD symptom scores based on overlap between measurement questionnaires.

(2C) To the extent that superficial similarities exist between disordered eating patterns and ON, it is expected that there would be some correlational overlap between measurement questionnaires; however, it is anticipated that this correlational trend *will not* be statistically significant.

(2D) ON symptom scores *will* be significantly predicted by overall health concern scores, based on overlap between the measurement questionnaires.

CHAPTER 3

METHODOLOGY

This chapter describes the study methodology. The research design was correlational and cross-sectional in nature. Study analyses were based on self-reported responses to questionnaires completed by college students. As a result of this study's reliance on self-reported measures, psychological diagnoses were not possible. Clinical diagnoses cannot be made on the basis of subjective self-reported responses on a small number of symptom questionnaires (Hunsley & Mash, 2007). Therefore, while this study evaluated important psychological constructs, actual psychological disorders were not diagnosed. Information regarding participant recruitment and selection, study procedures, and the measures used to operationalize predictor and criterion variables are discussed below.

Participants

After obtaining approval from the University of Missouri-Kansas City's Social Sciences Institutional Review Board (SSIRB), participants were recruited by the principle investigator (PI) from a sample of undergraduate students at the University of Missouri-Kansas City (UMKC). Individuals were eligible to participate in the study if they were at least 18 years of age and enrolled as a student at UMKC. At the time of the study, data collected by the university regarding student demographics indicated that approximately

58% of students were female and 42% were male. The average age of students at UMKC was 27 years old and 8% were International students. The ethnic backgrounds of the students were as follows: 66% White/Caucasian, 13% Black/African American, 7% Asian/Pacific Islander, 4% Hispanic/Latino, 1% American Indian/Alaskan Native, and 1% Multiple race/ethnicity (University of Missouri-Kansas City, 2010). Should an undergraduate have completed the survey materials after being advised that minors were not eligible to participate, their survey data would have been destroyed and excluded from data analysis; however, no minors participated in this study.

Procedures

Recruitment

Data were collected through the use of the UMKC Psychology Department online research participant recruitment system (Psych Pool). The study was listed as an active study on Psych Pool under the title, "College Student Lifestyles." Students taking a Psychology course that was participating in the Psych Pool were informed about the recruitment system by class instructors and were told that they could participate in the study to fulfill point requirements for research participation in the course. Through the electronic notification system of the Psych Pool system, the PI listed available days and times in which the students could meet with the PI on campus to complete the packet of questionnaires. At the meeting, the PI discussed the following study details with participants: purpose, procedures, possible risks and benefits of participating, and data confidentiality (Appendix B). All participants were provided a copy of the Study

Information Sheet after reviewing it with the PI. They were told that they could discontinue their participation at any time by returning the study questionnaires to the PI, who was present at all times. Individuals also were informed that their course instructor would be notified of their participation through the Psych Pool before the end of the semester so they could be allotted the appropriate amount of points permitted in their course.

Confidentiality

Students were told not to put any identifying information on study materials. Therefore, study questionnaires did not contain any identifying data, such as names or participant contact information. Although access to participant names was used for Psych Pool scheduling purposes and to report if the student participated in the study in order for them to receive course credit, this information was kept completely separate from the study questionnaires, which contained no identifying information. As a further method of ensuring participant confidentiality, all questionnaires were kept securely. Permission was granted by the SSIRB for the study database (electronic file) to be kept for three years following the completion of the study. However, after data entry was completed and checked for errors, the original questionnaires were shredded.

Participant Debriefing

Finally, participants were informed that a summary of the research findings was expected to be available approximately one year after their participation in the study. Each participant was provided with the principle investigator's permanent email address

(hotmail) and invited to email the PI after one year if they wished to obtain the study conclusions (study abstract). Participants were informed that no individual feedback could be provided regarding performance on surveys. Study participants also were informed that group results may be disseminated at the conclusion of the study to the scientific community through publications or professional presentations but that all study results and conclusions would be provided as grouped data, with no individual responses released to either study participants or any other individual.

Measures

The packet of questionnaires given to each participant contained five measures: (1) Demographics Questionnaire, developed for use in the study, (2) Symptom Checklist-90-Revised, (3) Eating Disorder Examination Questionnaire, (4) Wahler Physical Symptoms Inventory, and (5) ORTO-15, a questionnaire used to assess ON symptoms. Because the publishers require that access to these measures be controlled and monitored, the PI was present throughout the administration of these questionnaires.

Predictors

Demographic data.

For the purposes of this study, a *Demographics Questionnaire* was created. Participants were asked to report the following demographic characteristics: age, gender, ethnic background, major, year in college, self-reported height and weight, marital status, number of children, employment status, if they were attempting to manage their weight

through diet or exercise, their current smoking habits, and level of alcohol consumption (Appendix C).

Participants also were asked to report the education level and occupation for the head of the household in which they were raised in order to calculate SES. Participants were assigned to SES categories using Hollingshead and Redlich's (1958) algorithm. The Two Factor Index of Social Position (ISP) system yields 5 SES categories (Upper, Upper-Middle, Middle, Lower-Middle, and Lower). Following Hollingshead and Redlich (1985), SES was calculated as a weighted sum based on occupation and education. Both the occupation and education factors were coded with a range from 1 to 7, with 1 = higher executives of large concerns, proprietors, and major professionals to 7 = unskilled employees for occupation and 1= professional degree (MA, MD, PhD) to 7 = less than seven years of formal schooling for education respectively. Each scale score was multiplied by an assigned factor weight (7 for the occupation and 4 for the education scale) to obtain a partial score using the following equation: Scale Score x Factor Weight = Partial Score. Both the occupation and education partial scores were then summed to determine individuals' ISP, representing the following social positions: 11 – 17 = upper, 18 – 31 = upper-middle, 32 - 47 = middle, 48 - 63 = lower-middle, and 64 – 77 = lower).

This index remains one of the most widely used by researchers in a variety of settings, thereby facilitating comparison of results from this study to previous research (Mueller & Parcel, 1981). Results from previous studies have indicated that the ISP is a comparative assessment of SES to other commonly used empirically supported measures, such as the Duncan Socio-Economic Index and the Treiman's International Prestige Scale

(Hollingshead & Redlich, 1958; Miller, 1991; Slomczynski, Miller, & Kohn, 1981). Participants' SES was evaluated as a potential epidemiological factor associated with ON.

Participants' self-reported height and weight were used to calculate their BMI level using the standard NIH formula: BMI = weight in pounds x 703/ height^2 in inches (NIH, 2000). BMI level, in addition to the other demographic variables collected on this questionnaire were evaluated as potential epidemiological factors associated with ON symptoms.

Anxiety and obsessive-compulsive disorder measure.

Symptoms of Anxiety and OCD were included in the analysis as potential predictors of ON symptoms. To assess for these symptoms, two dimensions from the *Symptom Checklist-90-Revised* (SCL-90-R; Derogatis, 1983) were used. First, a description of the overall measure will be presented. Discussion of the specific dimensions that were used from this measure will follow.

The SCL-90-R is a self-reported paper and pencil questionnaire composed of a total of 90 items that measure a variety of psychological symptom patterns. The manual estimated that this measure would take approximately 15 minutes to complete and indicated that it can be used to measure psychological symptoms in individuals 13 years and older. Individuals were asked to indicate how must discomfort a problem had caused them during the previous 7 days. Response choices were rated on a 5-point scale, ranging from 0 = "not at all" to 4 = "extremely." Each of the dimension scores were

determined by averaging the item scores (e.g. adding together each response within each dimension to get a total score and then dividing by the number of items on the dimension). The raw score could then be converted to standard *T* scores (range of 0-100 with a mean of 50 and a standard deviation of 10) based on the appropriate normative data. Symptoms were considered increasingly more problematic to adaptive functioning as the *T* score reached 100, with a *T* score above 60 considered problematic (Derogatis, 1983). For the purpose of this study, only raw scores were used in study analyses. If more than 20% of the items (18 or more items) from the entire test or more than 40% of the items on one subscale were missing, the measurement was considered invalid and could not be interpreted. For the purposes of this study, only the Anxiety and the Obsessive-Compulsive Disorder subscale scores were used (discussed in more detail below).

Normative data collection for the SCL-90-R included four major normative cohorts; however, for the purposes of this study, only the normative responses from 493 male and 480 female adult non-patients were used. Overall the SCL-90-R items demonstrate high internal consistency with Cronbach alpha correlations ranging from .77-.90 among the subscales. Test-retest coefficients for the dimensions, using a 1 week interval, ranged from .78 to .90 (Derogatis, 1983). Convergent validity of the SCL-90-R was assessed by comparing the scales to other commonly used and empirically supported measures assessing similar constructs and is discussed below for each clinical scale individually (Derogatis, 1983). The SCL-90-R is a copyrighted measure and the materials were previously purchased from the publisher.

SCL-90-R anxiety dimension (SCL-90-R-A).

The Anxiety dimension was composed of 10 items that assessed individuals' overall anxiety symptoms. Items on this scale included general signs, cognitive components, and some somatic signs of anxiety. Those individuals who obtained *T* scores of 60 or higher on this dimension were considered to be experiencing detrimental levels of anxiety. The Anxiety Dimension has an internal consistency coefficient of .85 and a test-retest reliability of .80. A convergent correlation of .74 was found between the Anxiety dimension of the SCL-90-R and the Free-Floating Anxiety dimension of the Middlesex Hospital questionnaire. A convergent validity correlation of .57 was found between the Anxiety dimension of the SCL-90-R and the MMPI (Derogatis, 1983). The Anxiety subscale score of the SCL-90-R was included as a predictor and evaluated in order to examine the proportion of ON variance accounted for by anxiety.

SCL-90-R obsessive-compulsive dimension (SCL-R-90-O).

The Obsessive-Compulsive dimension of the SCL-90-R consisted of 10 items that assessed thoughts and impulses that individuals considered to be unremitting and undesirable. Higher *T* score values were associated with more symptoms of OCD. The Obsessive-Compulsive dimension has an internal consistency coefficient of .86 and a test-retest reliability of .85. A convergent correlation of .48 was found between the Obsessive-Compulsive dimensions of both the SCL-90-R and the Middlesex Hospital questionnaire (Derogatis, 1983). The subscale score from the Obsessive-Compulsive

dimension of the SCL-90-R was included as a predictor and examined in order to assess the proportion of ON variance accounted for by Obsessive-Compulsive symptoms.

Disordered eating pattern measure.

Symptoms of disordered eating patterns were included in the analyses as a potential predictor of ON scores. The *Eating Disorder Examination Questionnaire 6.0* (EDE-Q; Fairburn & Beglin, 1994) is a self-report questionnaire that is one of the most commonly used measures of disordered eating patterns (Lavender, De Young, & Anderson, 2010). This questionnaire is a shortened version derived directly from the Eating Disorder Examination (EDE; Fairburn, Cooper, & O'Connor, 2008) interview, which is considered the "gold standard" for assessing eating disorders due the high reliability and validity of this measure (Guest, 2000).

The author estimated that the EDE-Q would take approximately 15 minutes to complete and that it could be used to measure eating disorder attitudes and behaviors. The questionnaire asked individuals to indicate how frequently they engaged in different eating behaviors during the previous 28 days. The 36-item questionnaire was scored using a 7-point scale that included the following answer choices: 0 = no days, 1 = 1-5 days, 2 = 6-12 days, 3 = 13-15 days, 4 = 16-22 days, 5 = 23-27 days, and 6 = every day. The EDE-Q included a total of four subscales: Restraint, Eating Concern, Weight Concern, and Shape Concern. Although not included in the analyses for this study, these subscales could be used for subsequent secondary analyses.

Subscale scores were obtained by averaging the scores (e.g. adding together each response within each subscale to get a total score and then dividing by the number of items on the dimension). A Global index was found by averaging the scores of the 4 subscales (e.g. adding subscale scores together and then dividing by 4). Individuals' scores could then be compared to normative data, with a subscale score of 4 or higher in the clinical range. As long as more than half of the items were answered, the subscale scores could be determined (Fairburn & Beglin, 1994; Fairburn, Cooper, & O'Connor, 2008; Mond, Hay, Rodgers, Owen, & Beumont, 2004; Peterson et al., 2007). For the purposes of this study, the global subscale score was examined to assess the proportion of ON variance accounted for by disordered eating patterns.

Normative data for the EDE-Q included a community sample of 243 young women with an average age of 26.6 years (Fairburn & Beglin, 1994). Since that time, many other studies have been conducted and have verified the reliability and validity of the EDE-Q. Subsequent studies have found high internal consistency and test-retest correlation coefficients. One study found internal consistency Cronbach alpha correlations ranging from .73-.93 (Mond et al., 2004). Similarly, in a study involving 723 undergraduate women, internal consistency of the EDE-Q was high, with Cronbach alpha coefficients of .78-.93. High test-retest coefficients also were found for the subscales, ranging from .81-.94 in one study (Luce, Crowther, & Pole, 2008). Additionally, similar internal consistency coefficients were found in a study including 404 undergraduate men, with Cronbach alpha coefficients ranging from .78 for the restraint subscale to .93 for the global score on the EDE-Q (Lavender et al., 2010).

Convergent validity of the EDE-Q has most commonly been assessed by comparing it to the EDE, given that the EDE-Q was derived from this measure. The following Cronbach alpha coefficients have been found between the EDE and EDE-Q for each subscale: Restraint = .71, Eating Concern = .68, Weight Concern = .77, Shape Concern = .78, Global Score = .84 (Mond et al., 2004). The EDE-Q is published in a book by the author (Fairburn, 2008). The authors have made the EDE-Q available free of charge on their website and for the purposes of this study, this questionnaire was used with full attribution.

Health concerns.

General health concerns also were included in the analyses as a potential predictor of ON scores. The *Wahler Physical Symptoms Inventory* (WPSI; Wahler, 1983) is a self-report questionnaire that is used to assess the presence and intensity of somatic complaints. This measure has been used in a variety of health-related research. The author estimated that the WPSI would take approximately 10 minutes to complete. The questionnaire asked individuals to indicate how frequently they were bothered by a variety of physical concerns. The 42-item questionnaire was scored using a 6-point scale that included the following answer choices: 0 = almost never, 1 = about once a year, 2 = about once a month, 3 = about once a week, 4 = about twice a week, and 5 = nearly every day (Wahler, 1983).

The WPSI generated one overall score to assess individuals' level of health concerns. This overall score was obtained by adding the points for all of the item ratings.

The total score of the items was divided by the total number of items answered by the participant (items on which the individual indicated more than one response or omitted completely were not included in the calculation). This resulting value was the WPSI score, with higher scores indicative of greater somatic concern. While this measure allows for conversion to deciles for the purpose of comparing scores to normative samples, for the purpose of this study, only raw scores were used. The total WPSI score was used to assess the proportion of ON variance accounted for by overall health concern scores (Wahler, 1983).

Normative data for the WPSI included a Midwestern college sample of 246 college males and females with an average age of 19 years (range = 18-24 years). An adequate level of internal consistency has been found for this measure, with KR20 values between genders in different normative groups ranging from .88 to .94. According to Wahler, these values suggest that the WPSI is internally consistent among diverse groups (Wahler, 1983). In addition, adequate test-retest correlation coefficients have been found, with values including .94 for an interval of 1 day between testing and values of .45 (for males) and .82 (for females) up to 12 weeks between administrations (Wahler, 1983).

Convergent validity of the WPSI primarily was assessed by comparing it to the Minnesota Multiphasic Personality Inventory (MMPI). Although adequate correlation coefficients were found between the WPSI and many of the MMPI subscales, the highest correlations between these instruments were found for the Hypochondriasis scale, with alpha coefficients of .86 for females and .66 for males. In addition, adequate correlation coefficients between the WPSI and the Hysteria subscale on the MMPI also were found

with alpha coefficients of .64 for females and .59 for males (Wahler, 1983). The WPSI is a copyrighted measure and the materials were previously purchased from the publisher.

Criterion

ON symptoms.

Given the relatively recent development of ON, measures evaluating the symptoms of this eating pattern are lacking. To date, only two measures have been developed to assess ON concerns. Of these two measures, the *ORTO-15* test has been empirically investigated. The ORTO-15 is based on a dichotomous scale developed by Bratman (2000). However, Donini, Marsili, Graziani, Imbriale, and Cannella (2005) expanded Bratman's original scale to include 15 items designed to assess symptoms of ON. Responses to each item included "always," "often," "sometimes," and "never." Based on a scoring grid developed by the authors of the measure, items that received a score of 1 were indicative of orthorexia, while those with a score of 4 points indicated typical eating behavior. A total score of ON was developed by adding up the scores to each item, with total scores below 40 points considered to be indicative of ON.

Currently, little validation data exist for this measure, given the relatively recent development of the construct of ON (Donini et al., 2004). Nevertheless, the ORTO-15 is the most frequently used measure in the small number of existing studies examining the prevalence rates of ON symptoms in different populations (Aksoydan & Camci, 2009; Bosi et al., 2007; Fidan et al., 2010). As a result, ORTO-15 was included because it is the most frequently used measure of ON in current studies and by contrast to the other

existing ON measure, preliminary psychometric properties have been published. The ORTO-15 is published in the journal of *Eating and Weight Disorders* and was used in the study with full attribution.

Overview of Data Analyses

The purpose of this study was (1) to establish preliminary demographic characteristics of ON within a United States college student population and (2) to begin to evaluate the validity of ON as a distinct construct by considering the relationship between an ON measure in comparison to more psychometrically established measures of self-reported anxiety concerns, OCD symptom complaints, disordered eating patterns, and overall health concern using a US college sample.

Preliminary Analyses

As a prelude to the main analyses, descriptive statistics were performed on demographic variables (age, gender, ethnicity, education level, college major, marital status, number of children, employment status, BMI level, current weight management attempts, smoking behaviors, frequency of alcohol consumption, and SES) to determine the characteristics of the sample. In addition, analyses were performed to assess normality and kurtosis for each study measure. Additional descriptive statistics were conducted to examine mean scores and standard deviations of all study measures (SCL-90-R-A, SCL-90-R-O, EDE-Q, WPSI, and ORTO-15 scales).

Demographic Correlates of ON

To establish basic epidemiological parameters of ON in a college student sample, a series of descriptive statistics were performed on a subset of the study sample that scored within the ON threshold as determined by the ORTO-15. Specifically, the prevalence rates of ON were considered for a variety of demographic variables, including the following: age groups, gender ratios, ethnicity, education level, college major, marital status, number of children, employment status, and BMI level. In addition, the prevalence rates of ON symptoms were examined by weight management efforts, smoking status, alcohol consumption, and SES. Also, a correlation matrix was conducted to examine the inter-correlations among study variables and an independent t-test was conducted to test for significant differences in ON between genders.

ON Construct Validity Analyses

The second study hypothesis involved examining the relationship between ON and self-reported anxiety concerns, OCD symptom complaints, disordered eating patterns, and overall health concerns. As previously noted (see literature review), very little is known about the underlying construct validity of ON. In addition, the ORTO-15 measure is relatively new and the psychometric properties of the measure have yet to be systematically evaluated despite its current use in some studies. Therefore, prior to the regression analysis used to investigate the second study hypothesis, the overall reliability and factor structure of the ORTO-15 measure was evaluated.

An exploratory factor analysis was conducted due to a lack of previous empirical investigation into the factor structure of the ORTO-15. In addition, this analysis is used when a measure is relatively newly developed and has little theoretical basis or previous psychometric assessment (Tabachnick & Fidell, 2007). The results of the factor analysis of the ORTO-15 dictated the number of subsequent stepwise regression analyses that were conducted.

Following the initial evaluation of the ORTO-15 measure, regression analyses were performed to address the second study hypothesis, examining the relationship between ON and self-reported anxiety concerns, OCD symptom complaints, disordered eating patterns, and overall health concerns. Given that the literature provides very little guidance about the hypothesized impact of predictor variables as a model for entering predictors into the regression equation, a stepwise regression was considered most appropriate because each predictor variable is entered into the regression equation to determine the relative amount of variance accounted for in the criterion variable. Those predictor variables that do not account for a significant amount of the variance of the criterion variable are dropped from the equation resulting in a final regression equation consisting of the predictor variables that most influence the criterion variable (Mertler & Vannatta, 2005; Tabachnick & Fidell, 2007).

In summary, because the current literature regarding ON is limited, conflicting, and inconclusive, stepwise regression analyses were used to examine the proportion of ORTO-15 variance accounted for by the four predictors: (1) scores on the Anxiety dimension of the SCL-90-R, (2) scores on the Obsessive-Compulsive dimension of the

SCL-90-R, (3) scores on the EDE-Q Global scale, and (4) total score on the WPSI. The criterion variable was ON symptoms, as operationalized by scores on the ORTO-15 measure. An overview of this analysis is provided in Appendix D. Taking into consideration the likelihood of missing data, it was estimated that a minimum of 150 participants were needed in order to statistically detect a medium effect size of .15 with an alpha level of .05 and power of .80 (Cohen, 1988).

CHAPTER 4

RESULTS

Preliminary Analyses

At the study conclusion, responses from a total of 163 participants were included in data analyses. Self-reported demographic characteristics are presented in Table 1. The sample consisted primarily of female students between the ages of 18 and 40 years old (M = 19.94, SD = 3.01) with an average BMI in the normal weight category of 23.92 (SD = 5.03). The majority of the participants were Caucasian and lower level undergraduate students, with college majors focused on arts and sciences or health-related backgrounds. In addition, most of the sample consisted of single, full-time students, with no children. Approximately half of the participants reported that they were actively engaged in weight loss attempts, most commonly through diet and exercise. Furthermore, most of the participants reported not smoking cigarettes. Approximately half the participants reported drinking alcohol with an average of 3.85 (SD = 3.82) drinks a week. Finally, most of the study participants were categorized in the middle to upper-middle SES position. Based on the ON measure cut-off score, the majority of the study participants met the criteria for having ON (n = 135).

Table 1

Self-Reported Demographic Characteristics of Study Participants (n = 163)

Variable	*n**	*%*
Age, Mean (SD)	19.94	(3.01)
Gender		
Male	35	21.5
Female	128	78.5
Ethnicity		
Caucasian	91	55.8
Black/African American	26	16.0
Hispanic/Latino	13	8.0
Asian/Pacific Islander	12	7.4
American Indian/Alaskan Native	0	0
Other or Multiple Ethnicities	21	12.9
Year in College		
Freshman	69	42.3
Sophomore	28	17.2
Junior	26	16.0
Senior	29	17.8
Graduate Student	0	0
6 year Medical Program	11	6.7

(table continues--)

Variable	*n**	*%*
Major in College		
Psychology	45	27.5
Health-Focused	51	31.1
Biological Sciences	14	8.6
Other Arts & Sciences	36	21.9
Arts	6	3.6
Business	5	3.0
Education	4	2.4
Undecided	2	1.2
Marital Status		
Single	151	92.6
Married	6	3.7
Cohabiting	4	2.5
Separated	1	0.6
Divorced	1	0.6
Widowed	0	0
Number of Children		
None	147	92.5
1 Child	10	6.3
2 Children	0	0
3 or More Children	2	1.3

(table continues--)

Variable	*n**	*%*
Employment Status		
FT Student/No Employment	74	46.3
FT Student/PT Employment	67	41.9
FT Student/FT Employment	9	5.6
PT Student/No Employment	1	0.6
PT Student/PT Employment	7	4.4
PT Student/FT Employment	2	1.3
Current BMI, Mean, (SD)	23.92	(5.03)
Current Weight Loss Attempt		
No	80	49.4
Yes	82	50.6
Method of Weight Loss		
Managing Diet	12	7.4
Exercise	26	16.0
Days per Week Exercise, Mean, (SD)	3.88	(2.03)
Taking Diet Pills only	0	0
Weight Loss Program	1	0.6
Both Diet & Exercise	58	35.8
Diet, Exercise, Diet Pills	2	1.2
Diet, Exercise, Diet Pills, Program	1	0.6

(table continues--)

Variable	*n**	*%*
Lowest Adult Weight, Mean, (SD)	134.47	(30.65)
Highest Adult Weight, Mean, (SD)	158.28	(39.43)
Currently Smoke Cigarettes		
No	145	89.5
Yes	17	10.5
If Yes, Number Smoked per Day, Mean, (SD)	5.87	(5.59)
Currently Drink Alcohol		
No	87	53.4
Yes	76	46.6
If Yes, Number Drink per week, Mean, (SD)	3.85	(3.82)
SES/Social Position		
Class I: Upper Position	24	14.8
Class II: Upper-Middle Position	62	38.1
Class III: Middle Position	44	27.0
Class IV: Lower-Middle Position	27	16.5
Class V: Lower Position	6	3.6
Considered to have ON (cut-off score 40)		
No	28	17.2
Yes	135	82.8

*Due to missing data, some variables do not total 163 participants

Prior to conducting the main study analyses, descriptive statistics were conducted to examine the distribution of scores and screen for missing values and other potential abnormalities. Missing data values regarding demographic variables were minimal, with 4 cases missing for number of children, 3 for employment responses, and 1 for weight loss attempt. Additionally, only two cases of missing data were noted regarding study measures and were limited to responses on the SCL-90-R measure specifically. Given the minimal nature of the missing responses (1.2%), these cases were dropped from data analyses rather than being imputed and entered.

As shown in Table 2, tests of normality (e.g. Kolmogorov-Smirnov with Lilliefors significance level, plots, and histograms) indicated that all five variables (i.e. SCL-90-R-A, SCL-90-R-O, EDE-Q, WPSI, and ORTO-15) were significantly skewed and/or kurtotic. Although the analyses used in the present study assume normally distributed variables, these tests often are considered robust to violations of these assumptions. For this reason, the data were analyzed using raw scores.

Table 2

Variable Skewness and Kurtosis

Variable	Skewness	Kurtosis
SCL-90-R-A	1.57	3.27
SCL-90-R-O	.66	.16
EDE-Q	.77	-.07
WPSI	.90	.55
ORTO-15	-.49	.51

Means and standard deviations for self-reported study measures are shown in Table 3. For both anxiety and OCD symptom complaints, potential scores on the measure range from 1 to 10. Study results indicate minimal levels of both anxiety (M = .57; SD = .53) and OCD symptoms (M = 1.09; SD = .69). Minimal disordered eating patterns (M = 1.64, SD = 1.37) also were reported by study participants, with a score of 4 or higher considered in the clinical range. In addition, minimal general health concerns (M = .94, SD = .53) were reported, with a range of possible scores between 1 and 6. Finally, the majority of the participants (83%) in the overall sample reported eating behaviors that met the criteria for ON (total score of less than 40) according to the measure used in this study (M = 35.55, SD = 4.04).

Table 3

Means and Standard Deviation Scores on Study Measures (n = 163)

Measure	Mean	SD	Range (min/max)
SCL-90-R-A	.57	.53	0 - 3
SCL-90-R-O	1.09	.69	0 - 3.33
EDE-Q	1.64	1.37	0 - 5.80
WPSI	.94	.53	0.2 - 2.62
ORTO-15	35.55	4.04	22 - 45

Primary Analyses

Analyses for Hypothesis 1

As previously discussed (Overview of Data Analyses), the first set of hypotheses involved exploring potential demographic characteristics associated with ON within a college sample. Specifically, the study question involved analyzing the prevalence rates of ON symptoms for the following demographic variables: age, gender, ethnicity, education level, college major, marital status, number of children, employment status, BMI level, current weight management attempts, smoking behaviors, frequency of alcohol consumption, and SES. It was hypothesized that significant demographic correlates of ON would include: male gender, younger age, lower BMI level, lower education level, current weight management attempts, fewer risky behaviors (smoking

and consuming alcohol), higher SES, and Caucasian ethnicity. On the other hand, it was hypothesized that marital status, number of children, and employment status would have no significant relationship with ON scores.

First, descriptive statistics were performed on a subset of the study sample whose scores met the criteria of having ON (n = 135) according to the cut-off value of the ORTO-15 measure. Table 4 includes the basic epidemiological data for this subset of participants, who consisted primarily of Caucasian females with an average age of 19.93 years (SD = 3.05; range = 18-40 years). In addition, the majority of individuals considered to have ON were in their first year of college, single, had no children, and were enrolled as full-time students. The average BMI of individuals with ON symptoms was in the normal weight category of 23.81 (SD = 4.70). Approximately half of this subset of participants reported being involved in weight loss attempts, half reported consuming alcohol on a weekly basis, and most said they did not smoke cigarettes. Finally, based on the Index of Social Position, the majority of individuals with ON were categorized in the upper-middle SES position.

Table 4

Self-Reported Demographic Characteristics of ON Study Participants (n = 135)

Variable	*n**	*%*
Age, Mean (SD)	19.93	(3.05)
Gender		
Male	27	20.0
Female	108	80.0
Ethnicity		
Caucasian	76	56.3
Black/African American	21	15.6
Hispanic/Latino	9	6.7
Asian/Pacific Islander	10	7.4
Other or Multiple Ethnicity	19	14.1
Year in College		
Freshman	58	43.0
Sophomore	23	17.0
Junior	22	16.3
Senior	24	17.8
6 year Medical Program	8	5.9
Marital Status		
Single	124	91.9

(table continues--)

Variable	*n**	*%*
Married	6	4.4
Cohabiting	3	2.2
Separated	1	0.7
Divorced	1	0.7
Number of Children		
None	120	88.9
1 Child	9	6.7
3 or More Children	2	1.5
Employment Status		
FT Student/No Employment	58	43.0
FT Student/PT Employment	61	45.2
FT Student/FT Employment	7	5.2
PT Student/PT Employment	6	4.4
PT Student/FT Employment	1	0.7
Current BMI, Mean, (SD)	23.81	(4.70)
Current Weight Loss Attempt		
No	65	48.1
Yes	69	51.1
Currently Smoke Cigarettes		
No	122	90.4
Yes	12	8.9

(table continues--)

Variable	*n**	*%*
Currently Drink Alcohol		
No	69	51.1
Yes	66	48.9
SES/Social Position		
Class I: Upper Position	17	12.6
Class II: Upper-Middle Position	54	40.0
Class III: Middle Position	33	24.4
Class IV: Lower-Middle Position	25	18.5
Class V: Lower Position	6	4.3

*Due to missing data, some variables do not total 135 participants

A correlation matrix (Table 5) was produced to assess Pearson correlations for the raw scores of each study variable including the predictor (SCL-90-R-A, SCL-90-R-O, EDE-Q, WPSI), criterion (ORTO-15), and demographic variables (age, BMI, education level, SES, ethnicity, marital status, number of children, employment status, current weight management attempts, smoking behaviors, and frequency of alcohol consumption). The SCL-90-R-A was positively correlated with the three other predictor variables: SCL-90-R-O ($r = .66$, $p < .01$), EDE-Q ($r = .30$, $p < .01$), and WPSI ($r = .62$, $p < .01$). These results indicate that higher levels of general anxiety were significantly related to increased OCD symptom complaints, disordered eating patterns, and general health concerns. The SCL-90-O also was significantly positively correlated with both the

EDE-Q (r = .26, p < .01) and WPSI variables (r = .50, p < .01), indicating that a higher level of OCD symptom complaints was related to increased disordered eating patterns and general health concerns. In addition, a significant positive correlation was found between the EDE-Q and WPSI variables (r = .43, p < .01), suggesting that increased disordered eating patterns were associated with a higher number of general health concerns. The criterion variable, ORTO-15, was only significantly negatively correlated with the EDE-Q (r = -.26, p < .01), suggesting that a higher number of ON symptoms were significantly related to lower levels of disordered eating patterns. No other significant correlations between ORTO-15 and the other predictor variables were found, suggesting no significant relationship between these constructs. Significant correlations between study measures and various demographic variables also are included in Table 5.

Table 5

Correlations among Variables (n = 163)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. SCL-90-R-A																
2. SCL-90-R-O	.66**															
3. EDE-Q	.30**	.26**														
4. WPSI	.62**	.50**	.43**													

(table continues--)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
5. ORTO-15	.03	.10	-.26**	-.02												
6. Age	.09	.07	.10	.26**	.01											
7. BMI	.00	-.06	.29**	.15	.08	.18*										
8. Educ.	.05	.01	.20**	.05	-.03	.30**	.05									
9. SES	.05	.12	-.04	.13	-.04	.09	.09	-.18*								
10. Ethnicity	.04	.14	.04	-.04	-.01	.01	.06	.27**	.03							
11. Marital Status	-.07	.03	.08	.13	-.05	.58**	.10	.13	.04	.06						
12. Number Children	-.08	-.07	.03	.05	-.01	.65**	.20*	.09	.01	.11	.35**					
13. Employ. Status	.11	.08	.08	.09	.08	.21**	.10	.03	.19*	-.14	.16*	.07				
14. Weight Loss Attempt	.05	.06	.61**	.26**	-.06	.10	.44**	.06	-.01	.05	.15	.02	.14			
15. Smoking	.19*	.17*	-.02	.26**	.02	.21**	.08	-.04	.06	-.05	.07	-.03	.13	.02		
16. Alcohol	.23**	.24**	.16*	.33**	-.02	.22**	-.04	.05	.05	-.16*	.05	.02	.12	.00	.21**	

*$p < .05$, **$p < .01$, two-tailed

Finally, a separate analysis was conducted to examine differences in ON scores between genders. Specifically, an independent samples t-test was conducted to evaluate if there was a significant difference in ON for males and females. Results indicated that there was no significant difference in ON symptoms for males (M = 35.77, SD = 4.62), and females (M = 35.49, SD = 3.88; $t_{(161)} = .36$, p = .72).

Analyses for Hypothesis 2

Reliability analysis of ON measure.

The second set of study hypotheses examined the relationship between ON and self-reported anxiety concerns, OCD symptom complaints, disordered eating patterns, and overall health concerns. Prior to this analysis, the reliability of the ON measure (ORTO-15) was evaluated using this study's sample. Results from this analysis found a Cronbach alpha coefficient of .14 for the ORTO-15, suggesting that this measure had poor internal consistency.

Factor analysis of ON measure.

In addition, a factor analysis was conducted to assess the underlying factor structure of the 15 items of the ORTO-15. Inspection of the correlation matrix revealed the presence of many coefficients at .3 or above. The Kaiser-Meyer-Oklin value was .79 and Barlett's Test of Sphericity was significant, supporting the factorability of the correlation matrix.

Principle component analysis revealed the presence of five components with eigenvalues exceeding 1, explaining 25.26%, 12.24%, 8.73%, 7.24%, and 6.80% of the

variance respectively. An inspection of the screeplot revealed a clear break after the second component. To aid in the interpretation of the two components, Varimax rotation was performed. The rotated solution revealed the most parsimonious outcome for factor loadings (Table 6). The two factor solution explained 37.50% of the variance. Component 1 contributed 19.12% of the variance and measured "eating concern and worry" with a Cronbach alpha coefficient of .33. Component 2 contributed 18.38% of the variance and measured "perceived benefits of healthy eating" with a Cronbach alpha coefficient of .35. Two test items, addressing the taste of food being more important than the quality and believing that unhealthy food is also sold in stores, did not load sufficiently on either component and were excluded from subsequent analyses. The results of the factor analysis of the ORTO-15 indicated that two separate subsequent regression analyses were appropriate in order to address the second study hypothesis.

Table 6

Varimax Rotation of Two Factor Solution for ORTO-15 Items

	Component 1	Component 2
Item	Eating Concern & Worry	Perceived Benefits of Healthy Eating
3	.76	
7	.71	
2	-.65	

(table continues--)

Item	Component 1 Eating Concern & Worry	Component 2 Perceived Benefits of Healthy Eating
9	-.61	
4	.52	
15	.49	
8	-.41	
13	-.40	
12		.73
10		.70
6		.68
11		.64
1		-.50
% of variance explained	19.12%	18.38%

Note: only loadings above .3 are displayed

Stepwise regression analyses.

As previously described, the second set of study hypotheses examined the relationship between ON and self-reported anxiety concerns, OCD symptom complaints,

disordered eating patterns, and overall health concerns. As a result of the factor analysis of the ORTO-15, two stepwise regression analyses were conducted in order to determine the amount of variance the predictor variables (SCL-90-R-A, SCL-90-R-O, EDE-Q, and WPSI) accounted for in the two components of the ORTO-15. The first stepwise regression analysis evaluated the amount of variance the predictor variables accounted for in the first criterion, the eating concern and worry component of the ORTO-15 measure. The second stepwise regression analysis examined the amount of variance the predictor variables accounted for in the second criterion, the perceived benefits of healthy eating component of the ORTO-15. Inspection of residual scatterplots of both regression analyses indicated that the assumptions of normality, linearity, and independence of residuals were upheld.

Regression analysis for component 1: Eating concern and worry.

Results from the first stepwise regression analysis indicated that disordered eating patterns (EDE-Q; $\beta = -.26$) was the only significant predictor of the ORTO-15 component measuring eating concern and worry. Regression coefficients and *R* statistics are included in Table 7. The size and direction of the relationship indicated that a higher level of disordered eating pattern was related to fewer ON symptoms of eating concern and worry. Results of the regression analysis were statistically significant, $F_{(1,159)} = 11.32$, $p = .001$. The adjusted R^2 value of .06 indicates that 6% of ON symptoms regarding eating concern and worry were predicted by disordered eating patterns.

Table 7

Stepwise Regression Analysis to Predict ON Symptoms of Eating Concern and Worry (n = 163)

Independent Variables	B	SE	Beta	R^2	Adj. R^2	*F*	*P* value
Constant	21.22	.27					
EDE-Q (disordered eating patterns)	-.42	.13	-.26	.07	.06	11.32	.001

Regression analysis for component 2: Perceived benefits of healthy eating.

Results from the second stepwise regression analysis indicated that disordered eating patterns (EDE-Q; β = -.28) was the only significant predictor of the ORTO-15 component consisting of perceived benefits of healthy eating. Regression coefficients and *R* statistics are included in Table 8. The size and direction of the relationship indicated that a higher level of disordered eating pattern was related to fewer perceived benefits of healthy eating. Results of the regression analysis were statistically significant, $F_{(1,159)} = 13.32$, $p < .001$. The adjusted R^2 value of .07 indicates that 7% of ON symptoms of perceived benefits of healthy eating were predicted by disordered eating patterns.

Table 8

Stepwise Regression Analysis to Predict ON Symptoms of Perceived Benefits of Healthy Eating (n = 163)

Independent Variables	B	SE	Beta	R^2	Adj. R^2	*F*	*P* value
Constant	12.40	.30					
EDE-Q (disordered eating patterns)	-.52	.14	-.28	.08	.07	13.32	<.001

Refer to Table 9 for a summary of the study results and evaluation of the support of each hypothesis.

Table 9

Summary of Results and Corresponding Level of Support for Exploratory Hypotheses

Study Hypothesis	Support
1A. Demographic factors that will be associated with *significantly higher* ORTO-15 scores will include:	
Male gender	Not Supported
Younger age	Not Supported
Lower BMI level	Not Supported
Lower education level	Not Supported
Current weight management attempts	Not Supported
Less smoking	Not Supported
Less alcohol consumption	Not Supported
Higher SES	Not Supported
Caucasian ethnicity	Not Supported
1B. Demographic variables that will have *no relationship* with ORTO-15 scores will include:	
Marital status	Supported
Number of children	Supported
Employment status	Supported
2A. Some correlational overlap will be found between SCL-90-R-A and ORTO-15 but this correlational trend *will not* be significant.	Supported
2B. SCL-90-R-O scores *will not* significantly predict ORTO-15 scores.	Supported
2C. Some correlational overlap will be found between EDE-Q and ORTO-15 but this correlational trend *will not* be significant.	Not Supported
2D. WPSI scores *will* significantly predict ORTO-15 scores.	Not Supported

CHAPTER 5

DISCUSSION

The purpose of this study was to add to the currently limited research on the prevalence rates and symptomology of ON. Despite the relatively recent interest in this eating pattern, very few studies about ON have been conducted and currently, many questions remain unanswered. Therefore, the aim of this study focused on beginning to understand more about the prevalence rates of ON by first establishing preliminary demographic correlates in a convenience sample of United States college students. Secondly, this study also sought to evaluate the validity of ON as a potentially distinct construct by comparing a measure of ON to more psychometrically established measures of self-reported anxiety concerns, OCD symptom complaints, disordered eating patterns, and overall health concerns.

The first set of hypotheses for this study addressed the first study goal of beginning to develop a basic description of ON in an American college sample. The findings from this study failed to indicate a significant relationship between any of the proposed demographic variables and ON symptoms. Specifically, Hypothesis 1A was not supported as no significant relationship was found between ON symptoms and any of the following demographic variables: gender, age, BMI level, education level, SES, ethnicity, weight management attempts, smoking, or alcohol consumption. While

Hypothesis 1B was supported, the study findings indicated that there was no significant relationship in the present sample between ON symptoms and marital status, number of children, or employment status. Contrary to the results from the few previous studies examining the potential demographic variables linked to ON, the results of this study failed to find any significant relationship between these basic demographic characteristics and ON in the present college sample (Aksoydan & Camci, 2009; Bosi et al., 2007; Donini et al., 2004; Eriksson et al., 2008; Fidan et al., 2010).

One possible explanation for this finding may be differences between the cultural backgrounds of the participants included in study samples. Specifically, each previous ON study has involved European participants, while the present study is one of the few to include an American sample. Given the role that various cultural factors and societal trends play in eating patterns, it may be that important cultural differences between study participants attributed to the lack of relationship between demographic variables associated with ON in this study (Cafri, Yamamiya, Brannick, & Thompson, 2005; Cash & Pruzinsky, 2002; Crago, Shisslak, & Estes, 1996; Levine & Smolak, 1996; Thompson & Stice, 2001). In fact, while it is known that eating disorders exist across different cultures, studies have found important differences in both the clinical identification and prevalence estimates of individuals with disordered eating patterns as a result of cultural differences in symptom interpretation (Becker, 2007; Lee, 2001; Soh, Touyz, & Surgenor, 2006). Therefore, it may be that ON symptoms are expressed differently across cultures, which may explain the lack of significance of demographic variables in this study compared to other study findings. Clearly, additional research is needed to

further elucidate the demographic characteristics of individuals with ON in an American sample.

The second set of study hypotheses evaluated the validity of ON as a distinct construct from other clinically established disorders. The results from this study found that ON may be best conceptualized as composed of two components: eating concern and worry and perceived benefits of healthy eating. Study results indicated that self-reported disordered eating patterns significantly predicted both components of ON symptoms. Specifically, Hypothesis 2A and 2B were supported, indicating that no significant relationship was found between measures of overall anxiety symptoms or OCD symptoms and ON. On the other hand, the additional study hypotheses (2C-2D) were not supported by the study findings, as disordered eating patterns were found to significantly predict both components of ON symptoms while general health concerns were not predictive of ON.

Since the initial description of ON, a debate has existed regarding how to best conceptualize this eating pattern. Some individuals have suggested that ON is best understood as a form of eating disorder, while others have argued that it is one manifestation of OCD symptoms (Bratman, 2000; Mathieu, 2005). The conclusions from this study suggest that disordered eating patterns play a role in ON symptoms while overall anxiety, OCD symptoms complaints, and general health concerns do not play a significant role in ON symptomology. However, it is noteworthy that only a small percentage of the variance in ON symptoms (focus on eating concern and worry, 6%; perceived benefits of healthy eating, 7%) were accounted for by disordered eating

patterns. Given that nearly 93-94% of the variance of ON was not accounted for by disordered eating patterns, the complete picture of ON has yet emerge.

The study findings lead to a variety of possible explanations regarding the validity of ON as a construct. First, based on the findings of this study, it is possible that while ON may share some overlapping components of eating disorders, it may in fact be a separate and distinct psychological construct (Bratman, 2000). A contrasting conclusion may be that ON is not a psychological construct at all, and is simply a societal trend seen in some cultures (Mac Evilly, 2001). A final explanation for the results found in this study may be that ON shares features of a psychological construct that was not assessed in the current study. While the findings of this study suggest that ON shares some components of eating disorders, a large portion of variance of ON remains unaccounted for, indicating that the exact mechanism underlying ON symptoms has yet to be understood.

Limitations and Recommendations for Future Studies

The present study was the first known evaluation of ON symptoms in an American college sample that provides a preliminary step toward evaluating ON as a distinct construct. However, there are important factors that limit the generalizability of the study results. As detailed below, the homogeneity of the study sample, restriction of range in scores of the measures used, psychometric properties of the criterion measure, the use of self-reported responses, and the sampling methodology all limit the generalizability of these results (Shadish, Cook, & Campbell, 2002).

Homogeneity of Study Sample

First, the study results were limited by the homogeneity of the study sample. Specifically, the study participants were predominantly Caucasian, single, young adults who had no children. Given these participant characteristics, it is unclear if the results of this study can be generalized to other groups of individuals. While the results of this study are a preliminary step to understanding ON, additional research is needed to elucidate the prevalence rates of ON in the general population.

Restriction of Range in Scores on Measures

In addition, participants' responses on each of the measures were extremely restricted in range. In this sample, most of the measure scores were positively skewed, indicating that the majority of participants did not endorse clinically high levels of anxiety, OCD symptoms, disordered eating patterns, or general health concerns. Future research should include participants with a greater range of responses on study measures, particularly individuals who endorse clinically significant levels of anxiety, OCD, eating disorders, or general health concerns.

Psychometric Properties of the Criterion Measure

The psychometric properties of the measure used to assess ON symptoms also may limit generalizability of the study findings. This measure is the most widely used assessment of ON symptoms and preliminary evaluation of psychometric properties indicates that it has predictive validity (Donini et al., 2005). However, using the cut-off score of this measure, the majority of study participants (83%) were considered to have

ON. Likewise, in previous studies using this measure, frequently, up to half of study samples were classified as having ON (Aksoydan & Camci, 2009; Bosi et al., 2007; Kinzl et al., 2006). Psychological disorders, as Bratman (2000) posits ON to be, are considered to be distressing or impairing responses that are not typical or not culturally expected (Barlow & Durand, 2009; DSM-IV-TR, 2000). Indeed, prevalence rates for established eating disorders (AN, BN, and BED) have been estimated at less than 3% of the overall population (Barlow, 2008; DSM-IV-TR, 2000; Striegel-Moore & Franko, 2003). The estimation of prevalence rates of ON nearing half of study samples; on the other hand, is significantly greater than estimates of these other established disordered eating patterns.

An alternative ORTO-15 cut-off score of below 35 (indicating ON) was suggested in one study (Donini et al., 2005). If this cut-off score was applied to the present study, 30% of the study participants would be considered to have ON. While this figure remains a high proportion of individuals considered to have disordered eating behaviors, it is a substantial decrease from the 83% of study participants classified as having ON based on the ORTO-15 cut-off score of below 40. The lack of prior systematic evaluation into the psychometric properties of the measure (Bosi et al., 2007) as well as the difference in ON classification based on different cut-off scores raises a question about the overall reliability of the ORTO-15 classification system. Either way, the consistently high proportion of study samples considered to have ON according to this measure suggests that future research would benefit from further systematic evaluation of the psychometric properties of this measure for its use in subsequent studies.

Given that the development of the ORTO-15 remains in the preliminary stages, subsequent steps must be taken to develop the measure as a whole. In fact, the development of a psychological measure and meaningful cut-off scores involves many phases of in-depth empirical investigation. A few of the steps to measure development include investigating the validity of a particular test for its intended purpose, setting cut-off scores that reliably reflect the construct, and considering the consequences of using each cut-off score in different assessment contexts (Osterlind, 2006). The systematic evaluation of the ORTO-15 has yet to include any of these phases of measure development.

Currently, little progress has been made in the first step of measure development in regard to the ORTO-15, as previous studies lack a thorough investigation of the validity of this test for its intended usage. In fact, a formal operational definition of ON has yet to be established nor have specific diagnostic criteria been developed as of yet. In addition, no normative studies have been conducted for the ORTO-15 measure; therefore its ability to detect ON symptoms across different populations has yet to be empirically investigated. Regarding appropriate cut-off values on the ORTO-15, only one study has evaluated the predictive validity of these scores (Donini et al., 2005). Clearly, additional research is needed to investigate the validity of the ORTO-15 measure and the reliability of the cut-off scores.

While the present study was the first to take a critical look into the reliability and underlying components of the ORTO-15, additional evaluations into the psychometric properties of the measure are needed. The low Cronbach alpha coefficient (.14) of the

ORTO-15 found in this study suggests that the measure has poor internal consistency within a U.S. college student sample. Furthermore, the findings evaluating the underlying factor structure of the ORTO-15 suggest that rather than measuring a distinct construct of ON, the ORTO-15 may in fact measure two separate constructs (eating concern and worry and perceived benefits of healthy eating). Clearly more in-depth systematic evaluations into the reliability and validity of this measure are needed before any definitive conclusions can be made about the prevalence rates of ON in different populations.

The last step of developing psychological measures involves considering the consequences of using cut-off scores in different assessment contexts. This step also has yet to be systematically investigated with the ORTO-15. Currently, very little is known about the ability of ORTO-15 scores to be generalized across different populations. In addition, no normative data for the ORTO-15 has been developed, so it is impossible to determine how different populations score on this measure.

Furthermore, many of the test items included on the ORTO-15 may be endorsed differently by varying populations. Examples of a few of the questions asked on the ORTO-15 involve paying attention to calories in food when eating, making eating choices based on health status, and feeling confused when shopping for food. How individuals respond to these test items may be influenced by their current health concerns. For instance, individuals who have dietary restrictions due to medical concerns such as diabetes, heart disease, or post-bariatric surgery procedures (to name a few), may endorse many of the ORTO-15 items as a result of adhering to medical guidelines. In

these cases, it is possible for adherence to medical recommendations to be classified as ON symptoms simply due to the ORTO-15 cut-off scores. It is imperative that a more rigorous evaluation of the reliability and validity of the ORTO-15 measure cut-off scores be conducted before definite conclusions can be made about ON symptoms in different populations.

Use of Self-Reported Responses

Another study limitation is the reliance on self-reported responses for demographic variables such as weight, smoking, alcohol consumption, exercise behaviors, eating patterns, and psychological symptoms. Reporting bias is possible when variables are not manipulated within an experimental design or objectively assessed (Shadish et al., 2002). Previous research indicates that depending on participant characteristics, exercise behaviors tend to be over-reported while weight level and engagement in risky behaviors are subject to under-reporting (Adams et al., 2005; Craig & Adams, 2009; Fendrich, Mackesy-Amiti, Johnson, Hubbell, & Wislar, 2005; Flood, Webb, Lazarus, & Pang, 2000; Hebert et al., 2008). Future studies would benefit from objectively measuring these demographic characteristics in order to limit reporting bias.

Sampling Methodology

Additionally, sampling methods also limit the generalizability of findings from this study (Shadish et al., 2002). First, study participants were not randomly sampled which may have led to selection bias. The lack of clinically significant scores on study measures may be reflective of the greater reluctance of individuals with psychological

disorders to volunteer to participate in research studies (Kessler et al., 2007). It is possible that including a clinical population, especially individuals with OCD or eating disorder diagnoses, in future studies may result in different study findings.

Another threat to the generalizability of the findings from the present study results from the study sample consisting entirely of college students from a Midwest university. While students from both urban and rural backgrounds were included in the study, individuals in this sample may differ in important ways from those in more diverse areas of the country. Finally, many of the behaviors assessed in this study (i.e. weight loss attempts, engaging in risky behaviors) are dynamic processes that vary depending on life circumstances (Hibbard, Mahoney, Stock, & Tusler, 2007; Hibbard, Mahoney, Stockard, & Tusler, 2005; Marcus et al., 2000; Reyna & Farley, 2006). This study evaluated these behaviors during one time point, which does not allow for evaluation of changes in these behaviors over time. Despite these limitations, this study provides important preliminary information about the prevalence rates of ON within an American college population as well as an initial evaluation of the validity of ON as a construct.

Conclusions

In summary, some researchers have suggested that a new pattern of disordered eating has developed. However, studies regarding the demographic risk factors associated with this proposed "disorder" are lacking. The present study was the first known evaluation of demographic correlates of ON in an American college sample. The results of this study based on American college students did not confirm risk factors

identified by the few previous ON studies based on other samples. In addition, the findings from this study indicated that ON shares important characteristics with established eating disorders. However, it remains unclear if ON is a separate construct or consists of other psychological and behavioral components not accounted for in the present study.

Future research may benefit from the incorporation of different study methods, such as including participants with diverse demographic backgrounds, especially a clinical population, and employing objective behavioral assessments of demographic and behavioral characteristics. The process of diagnostic development involves a substantial investigation into the risk factors, symptoms, and outcomes of potential diagnoses. Consequently, any definitive classification of ON as a psychological disorder is extremely precipitous at the present time given that the limited existing studies have yet to establish even the preliminary steps toward the process of developing a psychological diagnosis (Blashfield et al., 1990; Campbell & Fiske, 1959; Kendall & Jablensky, 2003; Robins & Guze, 1970). Given the current societal emphasis on healthy behaviors and wellness, it is imperative that the underlying mechanisms of ON are better understood through continued empirical and systematic investigation before characterizing these eating behaviors as pathology.

APPENDIX A

Comparison of Diagnostic Validity of ON to Existing Disorders

	Eating Disorders			**Anxiety Disorders**		**ON**
	AN	**BN**	**BED**	**GAD**	**OCD**	
Formal operational definition	Yes	Yes	Yes	Yes	Yes	Preliminary definition
Formal diagnostic criteria	Yes	Yes	Yes	Yes	Yes	None
Construct validity step 1: Clinical description	Yes	Yes	Yes	Yes	Yes	Some mixed empirical evidence
Construct validity step 2: Laboratory findings	Yes	Yes	Yes	Yes	Yes	No empirical evidence
Construct validity step 3: Delimitation from other disorders	Yes	Yes	Yes	Yes	Yes	No empirical evidence
Construct validity step 4: Follow-up study	Yes	Yes	Yes	Yes	Yes	No empirical evidence
Construct validity step 5: Family study	Yes	Yes	Yes	Yes	Yes	No empirical evidence
Causes significant impairment/distress	Yes	Yes	Yes	Yes	Yes	Some anecdotal evidence
Frequency of symptoms	Yes	Yes	Yes	Yes	Yes	No empirical evidence
Duration of symptoms	Yes	Yes	Yes	Yes	Yes	Some anecdotal evidence

APPENDIX B

Study Information Sheet

College Student Lifestyles Study

Erin McInerney-Ernst, MA

You are being invited to participate in a research study on college student lifestyle patterns. In order to be eligible to participate in this study, you must be *at least 18 years of age* and currently enrolled in courses at UMKC. **If you are not at least 18 years of age, do not participate in this study.**

The purpose of this study is to learn more about the lifestyle patterns of college students. It is being conducted in order to help contribute to the broader research on differences in lifestyles in college students. It is estimated that about 100 people will participate in this study.

If you agree to take part in this study, your involvement will include completing a set of questionnaires without identifying information (such as your name). The questionnaires will ask you information such as your age, gender, ethnicity, education level, and overall lifestyle. The questionnaire packet should take you approximately 60-90 minutes to complete.

Your participation in this study is voluntary at all times. You may choose to not participate, not answer certain questions, or to withdraw your participation at any time by simply turning in your packet to the study's principle investigator. Although it is highly unlikely that the completion of these paper and pencil questionnaires will be distressing, in the unlikely event that emotional concerns arise, the university has a student counseling center available. Information on how to receive services from this center is attached.

There are no known risks or costs to you for participating in this study. You will receive research points for your course through the Psych Pool system. The main benefit of this study is to help researchers and practitioners better understand the lifestyle patterns of US college students.

The confidentiality of your data is very important. Please **do not provide any identifying information** on your questionnaires (i.e. no name, student ID number). All questionnaires will be stored securely until the data are entered, after which hard copies of study materials will be destroyed. While every effort will be made to keep confidential all of the information you complete and share, it cannot be absolutely guaranteed. Individuals from the University of Missouri-Kansas City Institutional Review Board (a committee that reviews and approves research studies), Research Protections Program, and Federal regulatory agencies may look at records related to this study for quality improvement and regulatory functions.

Results from this research may be shared with the scientific community (e.g. publications, professional presentations); however, the data will be presented as grouped responses only and your single responses will not be identifiable in the findings. In addition, **no feedback will be given to you or anyone else about your individual performance on study questionnaires.**

It is expected that the study conclusions will be available in approximately one year from today's date. If you would like a copy of the study conclusions (study abstract) in one year, please email the principle investigator, Erin McInerney-Ernst, at erinmac36@hotmail.com. Please note, however, all study results and conclusions will be provided as grouped data, therefore, no information about your individual responses will be available.

The University of Missouri-Kansas City appreciates the participation of people who help it carry out its function of developing knowledge through research. If you have any questions about the study that you are participating in you are encouraged to call Erin McInerney-Ernst, the principle investigator, at 816-835-1425 or contact her at erinmac36@hotmail.com.

Although it is not the University's policy to compensate or provide medical treatment for persons who participate in studies, if you think you have been injured as a result of participating in this study, please call the IRB Administrator of UMKC's Social Sciences Institutional Review Board at 816-235-1764.

By completing the attached questionnaires, you are indicating your willingness to participate in this study. You may begin your participation at this time and keep this form for your records.

APPENDIX C

Demographics Questionnaire

Today's Date: _____ ☐ Male ☐ Female

Date of Birth: _____ **Current Age: _____**

What is your current grade level at the University of Missouri-Kansas City?

☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior

☐ Graduate Student ☐ Student in the 6-year medical program

What is your major at UMKC? _____

If you have a minor, please list it here: _____

Which best describes your ethnic background? (Check all that apply).

☐ White/Caucasian ☐ Black/African American ☐ Hispanic/Latino

☐ Asian/Pacific Islander ☐ American Indian/Alaskan Native

☐ Other or Multiple Race/Ethnicity (specify): _____

What is your current marital status?

☐ Single ☐ Married ☐ Cohabitating ☐ Separated ☐ Divorced ☐ Widowed

How many children do you currently have? _____

What is your current employment status?

☐ Full-time student/no outside employment ☐ Part-time student/no outside employment

☐ Full-time student/ part-time employment ☐ Part-time student/ part-time employment

☐ Full-time student/ full-time employment ☐ Part-time student/full-time employment

How much do you currently weigh? _____

How tall are you? _____ feet and _____inches

Are you currently trying to lose weight?

☐ No ☐ Yes

If so, please check all the methods of weight control you are currently involved in

☐ managing diet

☐ engaging in exercise **How often do you exercise *each week?*** _____

☐ taking diet pills

☐ involved in a weight loss program (i.e. Weight Watchers, Slim 4 Life)

What has been your *lowest* weight as an adult? _____

What has been your *highest* weight as an adult? _____

Do you currently smoke cigarettes?

☐ No ☐ Yes

If so, about how many cigarettes do you smoke *each day?* _____

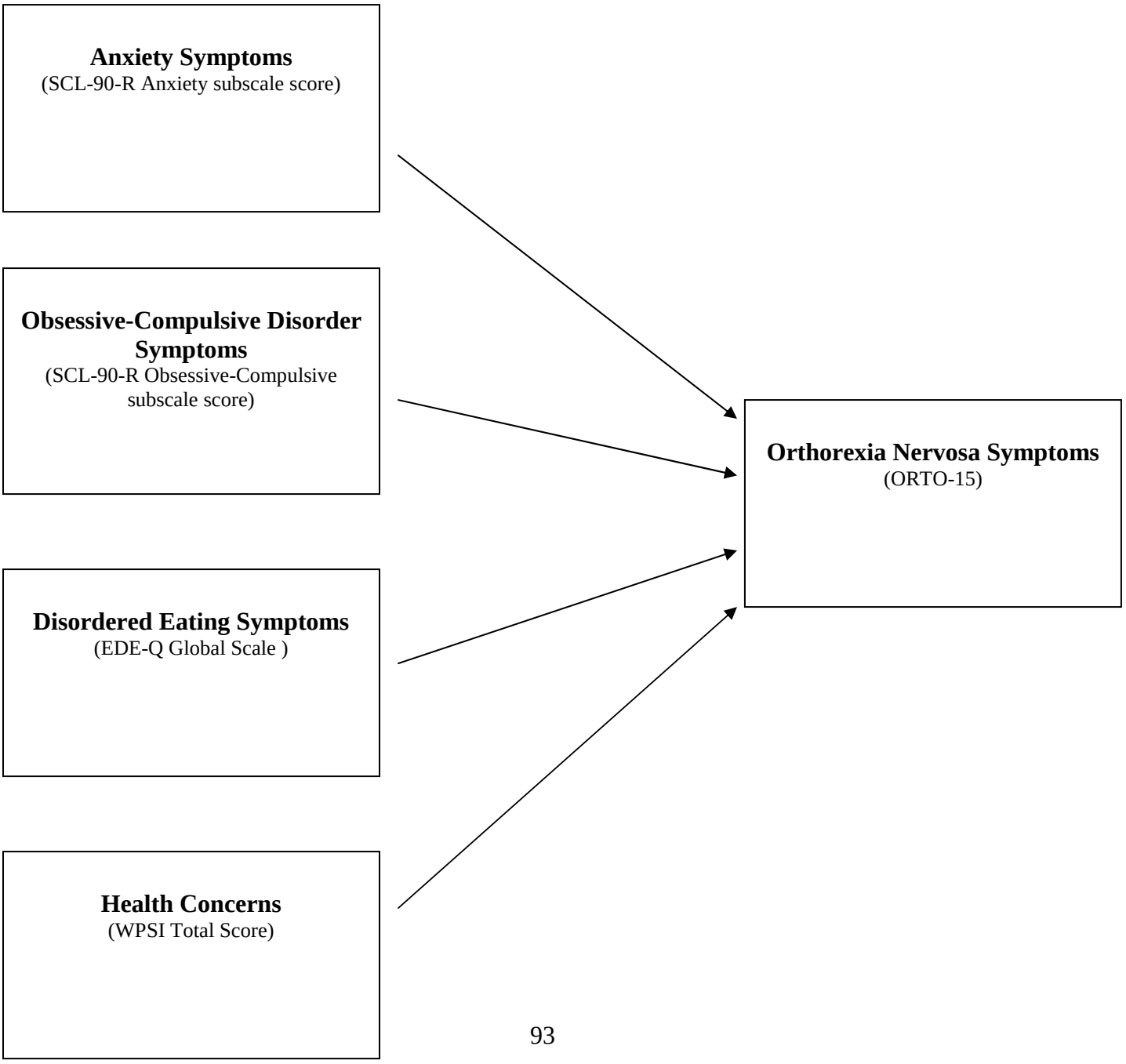
Do you currently drink alcohol?

☐ No ☐ Yes

If so, about how many alcoholic beverages do you drink *weekly?* _____

APPENDIX D

Conceptual Representation of Regression Analysis



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VITA

Erin Michelle McInerney-Ernst was born on September 30, 1981 in New Orleans, Louisiana and graduated from James E. Taylor High school in Katy, Texas. She went on to earn a Bachelor of Arts degree from the University of Texas at Austin in 2003. While a student at this university, she volunteered as an undergraduate Research Assistant in two psychology laboratories, studying Evolutionary Psychology and language acquisition in children. During this time, she also served in various honor societies and received the Liberal Arts Honors award upon graduation.

In 2004, she began working toward a doctorate in Clinical Psychology with an emphasis in health at the University of Missouri-Kansas City. She has worked as a Research Assistant studying areas of interest including Community Psychology, medication adherence, and grief issues. She received a Master of Arts degree in 2008. Her thesis topic, "Adjustment Outcomes following Paternal Loss among Adolescents," was inspired by her interest in grief and bereavement issues.

Additionally, she has taught various undergraduate courses such as General, Abnormal, and Health Psychology as well as statistic courses. She also has worked with clients at a variety of locations throughout the Kansas City area and is a member of the Society of Behavioral Medicine, American Psychological Association, and the Grief Support Network Board of Directors. Upon completion of her Doctor of Philosophy degree, she plans to provide individual psychotherapy and behavioral modification therapy in a hospital setting as well as continue teaching at the university level.