AN EXPLORATORY INVESTIGATION INTO THE STRUCTURE OF EATING DISORDER DIAGNOSIS

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AN EXPLORATORY INVESTIGATION INTO THE STRUCTURE OF
EATING DISORDER DIAGNOSIS

BY

JULIANA STEFFES

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
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OF

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ABSTRACT

This dissertation first provides the current conceptualization of the most common Eating Disorders (EDs) as well as other disordered eating conditions currently recognized within the research community. The current literature regarding the epidemiology, risk factors, existing evidence of indicators of overlap, and commonalities in treatment and prevention efforts among these disorders is identified. Researchers have mentioned the concept of a continuum of eating disordered behaviors or a spectrum of eating pathology, either using it in a paper title or within a research paper, yet few have conducted statistical analyses to illustrate that these concepts have more than face validity. This study used factor analysis (FA) to identify whether the current diagnostic schema is the best method for diagnosis of EDs. Exploratory and confirmatory factor analysis (EFA & CFA) as well as other descriptive statistics identified movement among disorders as well as overlap in symptomology. These results support the possibility that a dimensional model might be better suited for ED diagnosis.
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Chapter 1

Introduction

The Diagnostic and Statistical Manual (DSM) has become a staple among those professionals who treat individuals with psychological disorders. This manual is used to diagnose these disorders. The current manual, *DSM-5*, has included some of the most open language about the future of diagnosis for psychological disorders (APA, 2013). This language includes the mention of future dimensional models of diagnosis and statistical analyses being used to illustrate concurrence between clinical impressions and actual behaviors and features of diagnosis. Eating Disorders (EDs) are among some of the newest additions to the *DSM* and are considered in their infancy in what is understood about these disorders.

*Statement of the Problem*

EDs also fall into a group of disorders where there is not always agreement among professionals about how diagnoses are made. There is also confusion regarding symptom overlap between disorders or shared symptoms and movement among EDs over time. In the United States, a pre-occupation with thinness has also elevated the severity of one specific ED, placing it as superficially superior, but it has led to more insurance coverage for treatment for those with that diagnosis. This particular diagnosis is also higher among the more privileged in the United States, which also becomes problematic in making diagnosis inclusive and truly representative of all individuals. Movement away from the current diagnostic system for EDs could mean improvement for many individuals who are currently
unable to seek treatment for any reason (e.g. access, costs, stigma, perceived severity, etc.).

*Overview of the Study*

This dissertation first provides information about the current diagnostic categories and then moves towards explaining the justification of a possible Eating Disorder Spectrum (EDS) or other dimensional models using information from a review of the literature on risk factors and researchers’ current debates about the future of ED diagnosis. An ED survey was designed using the *DSM-5* clinical features, items about risk factors, and demographics. A total of 575 participants completed the entire survey and analyses were conducted on these data to examine the structure of ED diagnosis.

The analyses conducted on these data provide a statistical representation of a possible model using the current separate and distinct diagnostic system (uncorrelated model) as compared to both a model where there is overlap allowed (correlated model), and a model that subsumes all eating disorders into one group (perfectly correlated model). The results might allow researchers to move away from the current model towards what the *DSM-5* considers the future of diagnosis for many disorders, which is a system that combines nosology and taxonomy with a creation of a dimensional ED model that could allow for better identification of those at risk for EDs, and better grouping for intervention and treatment purposes as well. Additionally, a more precise ED model could allow for meaningful grouping with labels that are less stigmatizing so that more individuals with EDs might seek and gain access to appropriate treatment.
As previously stated, ED diagnosis can assist an individual in gaining access to insurance coverage but is not guaranteed for all diagnoses. Neither is ED diagnosis currently an important aspect of treatment options, treatment interventions, or prognosis. All individuals diagnosed with EDs who seek treatment whether outpatient, residential, or inpatient are treated within the same facilities. These individuals also attend the same groups and are only differentiated based on medical needs (e.g. weight restoration/weight maintenance).

These differentiations only guide food and exercise recommendations and do not assist treatment professionals in separating individuals for etiological differences. It is important to understand the origins of EDs. It is also important to consider comorbidity both within ED diagnosis and among other psychological disorders. These comorbid disorders are possibly important to examine when identifying a possible future model of ED diagnosis. This study examined comorbidity among EDs as well as comorbidity with other psychiatric disorders to assist in moving towards a more precise ED structure of diagnosis. The major research item is: Can the overarching measure EDS/dimensional models better explain the factors, Avoidant and Restrictive Food Intake Disorder (ARFID), Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge-Eating Disorder (BED), Other Specified Feeding or Eating Disorder (OSFED), and Unspecified Feeding or Eating Disorder (UFED)?

Hypotheses

1. EDs are separate and distinct disorders as the current classification indicates, versus there is significant overlap among EDs that might
indicate EDs are continuous variables rather than categorical variables as they are currently conceptualized.

2. The area of non-overlap among EDs is not related to behaviors versus the hypothesized area of non-overlap among EDs relates most specifically to behaviors (i.e., purge/no-purge, binge/no-binge, restricting/no restricting).

3. Shame is not indicated as a variable related to specific ED versus shame is an indicator related to specific ED.

4. Self-identified race/ethnic-identity is not indicated as a variable related to specific diagnosis versus self-identified race/ethnic-identity is a mediator/moderator of specific ED diagnosis.
Chapter 2

Review of the Literature

Current Conceptualization of Eating Disorders (EDs)

EDs are extreme cases that typically are identified in older children, adolescents, and adults. These disorders are conceptualized as separate and distinct disorders that include clinical features, associated features, risk factors, and etiological differences (APA, 2013). The feeding and eating disorders include Avoidant/Restrictive Feeding Intake Disorder (ARFID), Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge-Eating Disorder (BED), Other Specified Feeding or Eating Disorder, or Unspecified Feeding or Eating Disorder (UFED) (APA, 2013). The DSM-5 has specific criteria for the differential diagnosis of these disorders (e.g., criteria for AN vs. criteria for BED).

In the past, there were patients diagnosed with Eating Disorder Not Otherwise Specified (EDNOS); these individuals are now diagnosed with other categories (e.g. Other Specified Feeding or Eating Disorder). Clinical literature supports the diagnosis of these disorders within a nosological approach creating clear and distinct categories. Research suggests that there are many commonalities among these disorders that can create diagnostic inconsistencies and difficulty. This identified overlap and commonality among EDs has not been identified within two of the childhood limited feeding and eating disorders (i.e. Pica and Rumination Disorder) so these disorders were not included in this review. These two disorders are believed to have different underlying mechanisms and risk factors associated with their etiology, treatment, and
Pica is a feeding and eating disorder in which an individual craves and eats non-edible/non-food items (e.g., ash, clay, dirt, rocks). Although Pica is typically a childhood limited disorder, it can sometimes appear due to medical conditions (e.g., it may occur during pregnancy). Rumination disorder is also considered a childhood limited feeding and eating disorder in which an individual has repeated regurgitation of food that may be re-chewed, re-swallowed, or it may be spit-out (APA, 2013). Rumination disorder has been seen among individuals who are at risk for other EDs.

Although the DSM-5 acknowledges that there are correlations between obesity and many other mental disorders (e.g. BED), obesity is not included as a mental disorder within the ED section of the manual (APA, 2013). Similarly, fasting and extreme dieting does not always indicate pathology as it can be part of religious or cultural practices (APA, 2013). This information is important to understand in terms of differentiating between what is considered pathological in regard to ED behaviors.

Research studies on ED prevalence report rates somewhere between 10% and 15% of the population; also reported is high comorbidity among those with BED with a medical diagnosis of obesity. In previous versions of the DSM, some individuals were diagnosed with Eating Disorder Not Otherwise Specified (EDNOS); these diagnoses are now subsumed within other categories (i.e., BED, OSFED, & UFED) Many clinicians support the diagnosis of these disorders using the current nosological system where the EDs are clearly defined disorders. Past
research, however, has suggested that there are many commonalities among these disorders. These commonalities continue to raise issues in diagnostic consistency across clinicians, differential diagnosis, as well as confusion in diagnosis when multiple EDs appear in the same individual (e.g., an individual with BN diagnosis who now meets criteria for BED). The DSM-5 provides information about time requirements but the language is vague and could lead to subjective judgment that is inconsistent among cases. Achenbach (2017) explained that the heterogeneity within diagnoses is one area of concern with the current diagnostic system for psychiatric disorders. Descriptions of the clinical features, associated features, and etiology of the EDs reviewed should provide more information that may help illustrate the overlap and comorbidity issues.

*Avoidant/Restrictive Feeding Intake Disorder*

ARFID is characterized by an eating or feeding disruption that includes a lack of interest in eating or food. This avoidance is based on either sensory experience or concern about aversive consequences of eating (APA, 2013). The diagnosis is given when there is a failure to meet nutritional needs accompanied by significant weight loss or failure to meet weight goals in childhood, nutritional deficiency and dependence on supplemental nutrition (i.e., enteral feeding or nutritional supplements), and interference with psychosocial functioning.

An ARFID diagnosis can only be made if the disturbance is not due to lack of available food, culturally sanctioned practice, or exclusively in the course of another eating disorder, or due to another underlying medical condition or disease (APA, 2013). There is overlap between ARFID and AN related to restrictive food
intake and malnourishment, but there is difference in the psychopathology and reported reasons for restriction (Uher & Rutter, 2012). There must also not be a distorted view of weight or how the body is experienced to make a diagnosis of ARFID. There is still a lot of attention on the difference between these two disorders and the continuity of eating pathology between childhood and adulthood (Uher & Rutter, 2012).

Among those individuals diagnosed with ARFID there tends to be higher comorbidity with anxiety disorders, autism-spectrum disorder, obsessive compulsive disorder, and attention-deficit/hyperactivity disorder that might illustrate an increased risk of ARFID among those with one of these diagnoses. Environmental risks for ARFID include those with familial anxiety/stress as well as those with a parent with an eating disorder (APA, 2013). Genetic and physiological conditions that might increase risks for ARFID are gastrointestinal conditions (e.g. reflux) as well as other medical problems (APA, 2013). Some individuals who were previously diagnosed as eating disorder not otherwise specified (EDNOS) now meet criteria for an ARFID diagnosis.

Anorexia Nervosa

AN has often been misunderstood as a fear of being fat; many anorexic patients are truly aware of their unhealthy weight and many become distorted in their body image as they become more emaciated (CDC, 2015). Researchers state that the malnutrition influences prefrontal brain functioning and critical decision-making processes, leading to less accurate judgment about the seriousness of their current state (CDC, 2015). Clinicians also have reported issues with diagnosis
related to this missing core diagnostic feature (fear of fatness) among more than half of their patients, especially in patients diagnosed before 18 years of age (Watkins & Lask, 2008). The DSM-5 indicates that risk factors for this disorder include anxiety, obsessional traits in childhood, culture, setting that endorses thinness, sports/occupation involving need to be thin, genetic factors including first degree relative with this diagnosis increases risk (APA, 2013). Suicide risk should be evaluated with this disorder due to high mortality rate; 12 suicides occur per 100,000 individuals diagnosed with AN per year (APA, 2013).

This disorder is characterized by the inability to maintain at least what is considered a normal weight for an individual’s height, sex, and age typically determined through the use of an individual’s Body Mass Index (BMI). The BMI for an individual with AN typically falls under 18 (APA, 2013). There are different subtypes of anorexic behaviors, including restricting-type (ANr), who engage in only extremely low caloric intake; binge/purging-type (ANbp), who either vomit, exercise, or abuse laxatives/diuretics to compensate for calorie intake (Bryn, 2011).

Other AN symptoms include but are not limited to lack of menses, thinning hair, fine hair all over the body, and skeletal frame. Individuals diagnosed with BN can have many similarities and overlap but are distinguished by a separate group of diagnostic criteria. The DSM-5 makes its case to keep these disorders distinct (APA, 2013). Latent class analysis studies have indicated there may be less distinction between ANbp and BN, and that they might be variants of an eating
disorder syndrome related to binge-purge behaviors and severity (Wonderlich et al., 2007).

Bulimia Nervosa

BN is often the more stigmatized of the two predominantly known EDs due to the perceived lack of control associated with this disorder (Fingeret et al., 2006). BN is characterized by more than 3 months of periods of binge-purge behaviors occurring at least once a week and self-evaluation unduly influenced by weight/shape (APA, 2013). Binge behaviors include eating in excess of what is needed for the body, eating large amounts in secret or in a short period of time, eating large amounts of food with a sense of not having control or the ability to stop eating although the individual often feels physically full, and feeling guilty about the amount consumed. Within the diagnostic group of BN, these binge behaviors must occur with compensatory behaviors.

Compensatory behaviors include the use of excessive exercise to rid the body of consumed calories. Some individuals also use wrapping techniques where exercise is paired with layering of clothing, or plastic wrapping to increase the levels of sweat produced during movement or exercise. Subsumed within compensatory behaviors are also purging behaviors, which refer to behaviors that include self-induced vomiting, diuretic misuse or abuse, laxative misuse or abuse, and has included the use of ipecac in the past (formerly a vomit inducer for poison consumption no longer available OTC) to rid the body of the calories consumed during binge periods but also must not occur within ANbp episodes (APA, 2013).

There is a higher prevalence of BN than AN in the population (Herpetz et
al, 2010). Risk factors within the *DSM-5* for BN include temperament related to weight concerns, low self-esteem, depressive symptoms, social anxiety, internalization of thin-ideal, childhood obesity, early pubertal maturation (APA, 2013). Similar to other EDs prevalence rates are distinctly higher for women than men; however, men seek treatment less and most samples are obtained through treatment providers. BED is another disorder that was often left out in the past diagnostic manuals but has since been added to the DSM-5.

**Binge-Eating Disorder**

BED is characterized by binge-eating behavior meeting similar criteria to BN, with the distinction that these binge episodes occur without compensatory purge behaviors occurring after the episodes. BED is accompanied by feelings of guilt and depression following binge episodes, as well as decreased self-evaluation related to shame about body and eating behaviors (APA, 2013). This disorder within the *DSM-5* is distinct from obesity and other eating disorders. BED used to sometimes be grouped within Eating Disorder Not Otherwise Specified (EDNOS) within the DSM criteria; however, as previously explained, this category has since been removed upon the revision of the *DSM*.

**Eating Disorder Not Otherwise Specified**

The removal of the EDNOS category did remove the ability to determine that an individual might have more than one type of eating disorder at one time, forcing choice among diagnoses. This forced choice might limit diagnosis for individuals who move among disorders. The introduction of OSFED and UFED, however, does allow for subclinical levels to be addressed. Sub-clinical thresholds
were often grouped within the EDNOS category. These subclinical disorders are not homogenous and perhaps might make treatment difficult if the disorders have less commonality than difference. For example, purging disorder has been hypothesized to be vastly different than the other disorders in the Other Specified category (Smith, Crowther, & Lavender, 2018). Research has shown most of these disorders to be severe enough to receive a diagnosis and clinical attention, yet they are grouped in a less meaningful way.

Individuals previously diagnosed with EDNOS at times had symptoms that diminished progressively over time, and some of their eating behaviors ceased to be problematic; yet for other patients within that category their eating difficulties intensified, and their diagnosis changed from one eating disorder to another (Fairburn & Harrison, 2003). Many individuals diagnosed with EDs at one time or another meet criteria for one or all of these disorders (Herpetz et al., 2010). OSFED is the current group for those who once were diagnosed with EDNOS.

Other Specified Feeding or Eating Disorder

The *DSM-5* states that the diagnosis of OSFED should be used when there is the presentation of an eating disorder that causes both distress and impairment in various functioning yet does not meet the full criteria for any other feeding and eating disorder (APA, 2013). This diagnosis also often carries the additional reason as to why the disorder does not meet any other classified EDs (e.g. purging without episodes of bingeing). There is also the “other specified” section that includes atypical anorexia nervosa, bulimia nervosa (of low frequency and/or
limited duration), binge-eating disorder (of low frequency and/or limited duration),
purging disorder, and night eating syndrome (APA, 2013).

Atypical anorexia might include all criteria but significant weight loss. This
diagnosis could be used if the individual presents at normal or above normal
weight range with the characteristics of someone normally diagnosed with
anorexia (APA, 2013). This diagnosis is useful especially in cases where an
individual is a typical weight or for an individual who is overweight who is
anorexic yet not at a point where anyone might recognize this diagnosis due to
preconceptions about weight related to diagnosis. An individual’s weight is not an
accurate provider of the pattern of eating behaviors or compensatory behaviors that
an individual engages in within their disordered behaviors.

The bulimia nervosa or binge-eating disorder of low frequency or duration
require that the frequency of bingeing, purging, or compensatory behaviors is less
than the required number per the specific disorder. In addition to the low
frequency, these diagnoses also include the limited duration component that
requires that the ED has only been present less than 3 months (APA, 2013). The
allowance for a diagnosis with a duration less than 3 months might be crucial for
early detection and intervention efforts. There is extensive research related to
purging disorder (PD). Many researchers believe PD should not be subsumed
within OSFED. Instead, some believe that PD should either be a subcategory of
either AN/BN, or a stand-alone diagnosis (Keel & Striegel-Moore, 2009).

PD is recognized by recurrent purging behavior to control weight or shape.
PD studies show clinical significance of this disorder that illustrates more
similarities to AN and BED across dimensions, and less severity than BN in treatment outcome and course of illness (Smith, Crowther, & Lavender, 2017). This purging behavior might include self-induced vomiting, misuse of laxatives, diuretics, or other medications without the binge-eating episodes that occur within bulimia nervosa. There is also the absence of binge eating and caloric restriction with the purging behaviors that would be seen within ANbp.

Researchers found that the use of compensatory behaviors including vomiting, laxatives, and diuretics as well as non-purging fasting, excessive exercise was also indicated (Keel & Striegel-Moore, 2009). Some researchers believe that multiple methods of purging in the absence of binge episodes are part of the defining features of purging disorder (Keel & Striegel-Moore, 2009). The last of the subgroups within the Other Specified Feeding or Eating Disorder is night eating syndrome.

Night eating syndrome is defined by recurrent episodes of night eating. This night-time eating either occurs after waking from sleep during the night or after the evening meal. The eating is both conscious and is unrelated to external influences such as individual sleep-wake cycle or social norms (APA, 2013). Similar to many other eating disorders the disordered eating must cause distress or impairment in functioning and must be differentiated from other eating disorders, psychological disorders, medication use, or medical conditions (APA, 2013).

*Unspecified Feeding or Eating Disorder*

This last eating disorder category applies to presentations in which symptoms characteristic of a feeding and eating disorder meet the criteria of
clinically significant distress or impairment in psychosocial/occupational areas of functioning but do not meet the full-criteria for any of the disorders in feeding or eating (APA, 2013). The UFED category is used in situations in which the clinician does not specify which criteria are not met and includes times where a clinician lacks enough information for proper diagnosis (e.g., emergency-room setting) (APA, 2013). As previously stated, prior to the development of OSFED and UFED, there was the EDNOS category that was in the DSM-IV & DSM-IV-TR.

**Eating Disorder Spectrum Proposal (EDS)**

Autism Spectrum Disorder (ASD) is a useful example of creating a range of a disorder instead of multiple similar but distinct disorders. Researchers realized that the overlap of these disorders made diagnosis difficult and that creating a spectrum showed the broader range of disorders (e.g., Asperger’s, Pervasive Developmental Disorder, Autism, etc.). Creating a spectrum for disordered eating behaviors may help the many subclinical conditions to be assessed and treated while still allowing for a clear diagnosis. Prevalence rates among clinical-level eating disorders AN, BN, and BED (range = 0.8% to 3%, combined 5%) are relatively low compared to Other Specified and Unspecified Feeding or Eating Disorders (about 11.5%) (Culbert, Racine, & Klump, 2015).

This observance of higher prevalence among the less clear diagnostic categories suggests that there are more people who meet criteria for more ambiguous categories than the original full-threshold eating disorders. This change in conceptualization may also better inform research efforts related to the design
and implementation of prevention and intervention programs. Researchers have identified many shared risk factors among many of these disorders as well as significant overlap and movement among disorders (Fairburn & Harrison, 2003). These eating-related conditions may fall on a spectrum although they are viewed clinically as separate disorders/conditions. There have been researchers who have attempted to change the diagnostic model for eating disorders, but more research must be done to support such a drastic change in diagnostic approach (Wonderlich et al., 2007).

Achenbach’s research into a taxometric system of conceptualizing disorders can guide these efforts to explain the continuum on which these disorders fall, in a way that is more realistic considering risk factors, pathways, treatment outcome, or course for these disorders (Achenbach 1966; 2017). Creating an EDS could allow researchers to reduce debate about how to conceptualize EDs that change over time and/or have behaviors that might be associated with more than one disorder. Researchers have continued to question the validity of the diagnostic categories for EDs (Maj, Gaebel, Lopez-Ibor, & Sartorius, 2002). Researchers attempted a transdiagnostic approach for a possible eating disorder that subsumes all eating disorders; however, data suggest that some of the eating disorders have fewer commonalities than others (e.g. AN-r and BN & BED) (Wonderlich et al., 2007).

Another approach using taxometric analyses has indicated possible different dimensions of severity and that AN might fall on a continuum with normality rather than a distinct ED, and it may be dissimilar to the binge-purge
disorders (Wonderlich et al., 2007). This study’s aim is to further illustrate how behaviors, symptoms, and shared risk factors might be better indicators of how these EDs overlap and share more than they have in distinction from one another. EDS could use dimensions that allow for the use of the areas of overlap in a way that might better group EDs for prevention, intervention, and treatment efforts. An area to include in a future dimensional model or EDS would be the use of the co-occurring disorders (i.e. comorbidity with other psychological disorders).

Comorbidity

All current EDs are associated with significant functional impairment and numerous psychological problems that include elevated rates of mood disorders, anxiety disorders, substance use, and impulse-control disorders (Baker, Mitchell, Neale, & Kendler, 2010). Comorbidity also has been indicated as a predictor of poorer treatment outcome related to increased severity of symptomology of eating-disordered behaviors (Keel, Brown, Holm, Denoma, & Bodell, 2011). In a study comparing a control group, those at risk for developing EDs, and those already diagnosed with EDs, comorbidity increased as risk increased (Aspen, Weisman, Vannucci, Nafiz, Gredysa, Kass, & Taylor, 2014). Researchers have suggested that some individuals might present more similarly with varying ED diagnoses due to comorbidity of other mental disorders. These comorbid disorders might explain some of the heterogeneity within the specific categories. Many researchers have indicated there is significant comorbidity among many of the core DSM disorders including but not limited to anxiety disorders, personality disorders, and mood disorders (Hudson, Hiripi, Pope, & Kessler, 2007).
**Behaviors**

Most behaviors associated with EDs comprise three binary dimensions: (a) the presence or absence of binge eating behaviors, (b) the presence or absence of purging/compensatory behaviors, and (c) the presence or absence of food intake restriction. Several studies have shown that there might be a possibility that there are more similarities among EDs with binge-only symptomatology than those with binge-purge behaviors. Other studies suggest a variable of distinction is either the presence or absence of purging behaviors, specifically the use of a single purging method or multiple purging methods (Edler, Haedt, & Keel, 2007). Studies have shown that there is an increased severity in symptomatology, impairment, treatment response, and overall course of illness as the number of purging methods increases (Edler, Haedt, & Keel, 2007).

Other studies have illustrated that even in ANr there have been reports of some binge-purge behavior over time as well as some cross-over from AN to BN, which might suggest that ANbp might represent a more severe type of AN rather than a subtype (Wonderlich et al., 2007). Past research on EDs also illustrated that the majority of individuals were not identified within the specific ED diagnosis but rather 60% fell within the EDNOS category within the *DSM-IV* (Fairburn & Bohn, 2005). Other areas that might be important to explore for more accurate diagnosis are the specific risk factors.

**Risk and Protective Factors**

*Less Malleable Shared Risk Factors*

EDs have many shared risk factors, for example, media images have been
implicated in body-image disturbances in boys and girls as well as eating problems in girls (Smolak & Stein, 2006). Participation/lack of participation in sports has been associated with body shame and later obesity in women (Alfano, Klesges, Murray Beech, & McClanahan, 2002). Researchers have found that body image, disordered eating, eating disorders, and obesity are related to each other (Smolak, 2008). Researchers also have found that dieting might be a predictor for later development of eating disorders and obesity (Haines & Neumark-Sztainer, 2006). Less malleable factors would include those that are not targeted areas for prevention but illustrate commonality among the EDs.

Genetic factors related to the development of AN, BN, BED, and Obesity recently have gained attention as they relate to the development of these disorders (Cicchetti & Curtis, 2006; Cowen, Clifford, Walsh, Williams, & Fairburn, 1996; Smolak, 2008). Gender is another factor that has been considered as a risk factor for eating-disordered behaviors and attitudes (Smolak, 2008). Objectification of both men’s and women’s bodies leads to body dissatisfaction, comparison, and self-objectification (Smolak, 2008). Objectification theory also explains the component of body shame and how women internalize the thin ideal (Thompson & Stice, 2001). This objectification has been associated with the use of compensatory behaviors and unhealthy or pathological eating behaviors (Kazsia, Murnen, & Tylka, 2016). Trauma in the form of sexual/physical/emotional abuse, sexual violence, and sexual harassment has been indicated as a risk factor for the development of EDs. These traumas have been associated with increased body dissatisfaction, body-image disturbances, and disordered eating behaviors in
elementary school and high school (Ackard & Neumark-Sztainer, 2002; Murnen & Smolak, 2000; Smolak, 2008; Wonderlich et al., 2007).

*More Malleable Shared Risk Factors*

There are also several risk factors that are more environmental in nature that have been associated with the development of EDs and other eating-related problems (i.e. Obesity and Diabetes). Researchers have focused attention on dieting, body-image dissatisfaction, media use, and weight-related teasing as the societal risk factors that are most easily changed through prevention programs (Neumark-Sztainer & Haines, 2006). For example, Grunbaum and Kinchen (2004) found through the 2003 Youth Risk Behavior Surveillance System (YRBSS) that 60% of females and 29% of males reported attempts to lose weight using unhealthy methods (e.g. laxatives, weight-loss pills, vomiting, and fasting). In addition, survey research has indicated that children and adolescents spend approximately 6.5 hours a day accessing media through electronic devices (Rideout, Roberts, & Foehr, 2005). Neumark-Sztainer, Story, and Hannan (2002) found that children had more requests for foods that they were exposed to through food advertisements.

Media also have been implicated in the promotion of the “thin ideal” or “culture-specific ideal” for women and “muscular ideal” for men (Harris, 2015; Leit, Pope, & Gray, 2001). Field, Camargo, and Taylor (1999) found that adolescent girls who reported idealizing media images also reported increased purging and/or restricting behaviors. Body dissatisfaction also is indicated in several studies as the single most predictive risk factor for the development of an
ED (Karazsia, Murnen, & Tylka, 2016). Further, researchers have found that youth who have experienced weight-related teasing are twice as likely to engage in binge-eating behavior compared to their peers who did not experience weight-related teasing (Neumark-Sztainer, & Haines, 2006).

*Treatment & Prevention*

There is overlap in the treatment recommendations for EDs. For example, decreasing dieting behavior through education about healthy eating and exercise has been shown to decrease the use of compensatory and/or purging behaviors as well as other unhealthy weight-loss methods (Stice, 2002). Decreasing exposure to media messages promoting unrealistic ideals and helping children learn to be more critical media consumers also are recommended in treatment programs (Neumark-Sztainer, & Haines, 2006). Vaguhn and Fouts (2003) found in a sample of adolescents, that decreased magazine exposure over a 16-month period led to significant decreases in ED symptoms. Media literacy in children, is a protective factor for decreasing risk for ED diagnosis later in life.

EDs are treated at outpatient, intensive outpatient, partial-hospitalization, and residential/inpatient-level care in the same facilities. Affected individuals attend the same groups and receive almost identical treatment. Most differences in treatment plans are due to the focus of the specific behaviors and specific factors that lead to ED diagnosis. Differences in meal plans exist due to metabolic, BMI, and other health differences among patients. Researchers have found that the important focus for the prevention of these disorders share the core
recommendations of promoting and sustaining healthful and balanced nutritional and physical-activity behaviors (Schwartz & Henderson, 2009).

Most medical professionals use the DSM-5 to diagnose EDs (Gupta, Krishnan, Deb, Mahapatra, & Sharan, 2016). Studies to date have shown that there may be support for a taxometric or factor-mixture analysis to create a better model for diagnosis (Smith, Crowther, & Lavender, 2017; Wonderlich, Joiner Jr, Keel, Williamson, & Crosby, 2007). Some researchers believe that the current DSM-5 categorical diagnostic system does not fully represent and explain the psychological traits that are crucial for the psychopathological analysis and treatment of eating disorders (EDs) (Izydorczyk & Wojciechowski, 2016). In proposing a change to the categorical structure of diagnosis, the proposed study aims to examine the area of overlap (i.e. comorbidity of EDs) to determine if this area of overlap is significant and important enough to keep EDs as categories. Information about the distinction of disorders might also provide important knowledge about novel ways of classifying these disorders (e.g., on a continuum/spectrum).

Further Evidence for EDS

Figure 2.1 is a simplistic diagram of the current diagnostic schema using the current diagnostic measures that lead to DSM-5 ED diagnosis. This figure is used solely for the comparison to Figure 2.2 that represents a visual representation of a possible EDS. Researchers frequently have expressed the concept of a spectrum of EDs; however, no study to date has demonstrated that this concept has statistical validity. For example, Isomaa, Lukkarila, Ollila, Nenonen, and
Charpentier (2016) simply reported that “Eating behavior can be viewed as a continuum, ranging from extremely restrictive to extremely disinhibited eating” (p. 542). Researchers have continued to use similar language in their conceptualization of ED behaviors.

Figure 2.2 illustrates a possible relationship between EDs, where the relationship between ANr and BN is stronger than the relationship between ANr and BED. OSFED and UFED would no longer be needed diagnostic categories in an EDS or dimensional model due to an individual now having the opportunity to fall somewhere on the spectrum in relation to different possible dimensional indicators. For example, an individual with a current OSFED diagnosis of Atypical Anorexia subtype would now fall along the EDS somewhere on a possible low to moderate level restricting behavioral dimension.

Figure 2.1. Current ED diagnostic conceptualization. Behaviors are included as well as the other clinical indicators in the DSM-5 to provide the 6 EDs used in this analysis.
Figure 2.2. Proposed EDS Model that illustrates the inclusion of overlap between EDs allowing for an EDS type diagnostic system where there would no longer be OSFED and UFED, and possible other diagnostic labels would be unnecessary as well.

The introduction to the *DSM-5* has suggested a movement towards more dimensional paradigms of psychiatric disorders to assist clinicians with providing the most inclusive diagnosis for treatment specification (Achenbach, 2017; APA, 2013). Autism Spectrum Disorder (ASD) provides a current example of a dimensional classification system from a previously nosological diagnostic paradigm.

Researchers and clinicians identified significant overlap among all of the Pervasive Developmental Disorders (i.e. Asperger’s Disorder, Autism, Childhood Disintegrative Disorder, Pervasive Developmental Disorder Not Otherwise Specified, and Rhett syndrome). The overlap of these disorders made differential diagnosis difficult and at times led to inappropriate treatment recommendations due to misdiagnosis (Matson & Nebel-Schwalm, 2007). Higher prevalence rates among the specific diagnosis of Pervasive Developmental Disorder Not Otherwise
Specified (PDDNOS) also led to a grouping that was much less homogenous than the diagnostic criteria might suggest.

The combination of clinicians identifying significant overlap and majority of individuals being identified within this less distinct PDDNOS category guided these professionals to re-conceptualize these disorders as a spectrum for a broad dimensional diagnostic model (Matson & Nebel-Schwalm, 2007). ASD has allowed for subclinical conditions to be assessed and treated while still providing enough information to allow for specification of treatment. Specification of treatment is done through the use of specifiers of core features that provide ratings on different dimensions of symptoms (APA, 2013).

ED diagnostic categories share some of the same problems that the disorders aggregated into ASD once faced. Clinicians report issues with differential diagnosis, comorbidity, movement among disorders, and subthreshold EDs. The newest edition of the DSM has alleviated some of the concerns with earlier editions related to subthreshold disorders including ED with limited duration and frequency, but prevalence rates among the clinical-level eating disorders of ANr, ANbp, BN, and BED) (range = 0.8% to 3%, combined 5%) are relatively low compared to OSFED and UFED (about 11.5%) (Culbert, Racine, & Klump, 2015). These prevalence rates can provide a glimpse of the issues with the most well-known and defined of these disorders not truly representing the vast majority of those diagnosed with EDs.

The reported observance of higher prevalence rates among the less clear ED diagnostic categories suggests that there are more individuals who fall within
the ambiguous categories rather than the original full-threshold EDs. Due to the high rates of individuals who historically have fallen in these largely heterogeneous subthreshold EDs, this possible change in conceptual structure would be useful for more appropriate diagnosis.

More appropriate diagnosis has been suggested to be related to more accurate medication selection, better specificity in therapeutic models for treatment, and better prognosis for the individual with an ED/EDs (Fairburn, Cooper, & Shafran, 2003). The ability for clinicians to have a faster and more reliable diagnostic schemata would also help with treatment recommendations, interventions, and prevention efforts targeted to specific EDs. The differences between these EDs are more related to frequency and type of behavior present and less related to difference in the maintaining mechanisms of the disordered behaviors.

Other Possible Indicators of Overlap for ED Factors

Many individuals diagnosed with EDs have engaged in behaviors that occur outside of their primary ED diagnosis group. There is also movement among disorders that leads individuals with EDs to meet criteria for one or more of these disorders at different times (Herpetz et al., 2010). Previous research suggests that some of the EDs have fewer commonalities than others (e.g., ANr might have more overlap with BN than with BED) (Wonderlich et al., 2007).

The diagnostic clinical features, associated features, and comorbid disorders will likely all be important components of these factors. Besides the obvious overlap of ED behaviors, researchers have identified many shared risk factors among these disorders as well as significant overlap in comorbid disorders.
and movement among disorders (Fairburn & Harrison, 2003). These factors include but are not limited to body dissatisfaction, history of trauma, family history of ED, and exposure to unrealistic body ideals (Thompson & Stice, 2001).

Figure 2.3 illustrates the concept that risk factors can lead to either what is considered multifinality or equifinality (i.e., multiple outcomes or one outcome respectively) (Wicks-Nelson & Israel, 2013). For example, the risk factor of high media exposure could lead to ANr, ANbp, BED, or another ED that could be conceptualized as a multifinality or equifinality pathway if you consider the disorders as distinct or highly correlated.

It is important to note that many of the risk factors for EDs are also risk factors for many other psychiatric disorders, but this may be somewhat related to the high rates of comorbidity with EDs. The issue of comorbidity has continuously remained an issue in the nosological nature of diagnostic systems as differential
diagnoses and specification of treatment are complicated due to the heterogeneity within diagnostic categories. The high levels of comorbidity have led researchers to examine this issue and they have reported rates as high as 90% of individuals diagnosed with EDs reporting comorbid diagnoses (Matson & Nebel-Schwalm, 2007).

Another study using a taxometric approach, has indicated possible different dimensions of severity and that it is possible that ANr might fall on a continuum with normality rather than as a distinct ED, dissimilar to the binge-purge disorders (Wonderlich et al., 2007). There also has been research suggesting that individuals diagnosed with particular EDs are more/less likely to seek treatment, suggesting there might be higher levels of shame associated with the specific disorder, or possibly specific disorders are more or less prevalent in groups who have or who lack access to health-care services (Hudson, Hiripi, Pope, & Kessler, 2007).

This chapter reviewed the current diagnostic structure of EDs, specifically AN, BN, BED, OSFED, and UFED. The behaviors that individuals with ED diagnoses engage in were reviewed. These behaviors include bingeing only, restricting only, binge-purge episodes, and compensatory behaviors. The possibility of an EDS was discussed which reviewed how the many disorders that now make up ASD led clinicians to restructure those diagnoses into a spectrum. Some of the issues related to difficulty with differential diagnosis, comorbidity, and higher prevalence in the more ambiguous diagnoses (i.e., PDD-NOS). Similarly, EDs have these same clinical issues related to diagnosis.

Another area of concern has been comorbidity both of other EDs due to the
use of behaviors outside of specific diagnosis, but also comorbidity with other psychological disorders. Risk and protective factors were discussed in how dimensions and grouping might utilize these factors to create more specified treatment. EDs are considered to be in their infancy in relation to the creation of the *DSM* and the other psychological disorders that are defined. Researchers continue to debate the accuracy of the current grouping for EDs. Taxometric research and dimensional diagnostic models appear to be the movement for future ED diagnostic models.
Chapter 3

Methods

Participants

Both male and female participants were recruited for this study. This study used a clinical sample (i.e., only those clinically diagnosed with EDs). The survey used exclusionary criteria to allow for only those with ED diagnosis. Researchers have suggested that clinical samples are useful in situations where there is an examination of pathology, as a normal sample would appear more skewed and have too few participants endorsing levels of pathology that would allow for close examination of the disorders of interest (Mehler & Andersen, 2017). As anticipated, there were significantly more females than males, this higher number of females is both due to higher prevalence and historical underrepresentation of males seeking treatment for EDs. Population-based samples, however, have found more representative female to male ratios (Mehler & Andersen, 2017).

The expected sample size was approximately 1000 participants, with the aspiration of stratified representation of men for each ED diagnosis (i.e., ED factor). There were 939 participants who consented to the study. Only 575, however, completed the entire survey. There is not a specified rule on the total number of participants needed for CFA; however, research has suggested that approximately 10 participants per estimated parameter are typically adequate (Schreiber, Stage, King, Nora, & Barlow, 2006). The sample size of 575 allowed for multiple analyses to be conducted including a CFA to determine if the current categories are truly orthogonal and best conceptualized the way that the DSM-5
indicates (Hoyle, 2000).

This large sample also allowed for follow-up CFA on a separate group of 200 for replication purposes, possible cluster analysis to identify taxon or dimensional groupings, multiple regression to assess whether or not shame is possibly related to prognosis and/or specific diagnosis. Measurement invariance is another application of CFA that could be used; if there were enough individuals represented in racial-identity or gender-identity groups, a multiple sample analysis might be run to determine if the model fits well across groups (Hoyle, 2000). Past research has suggested that EDs differ across groups in prevalence rates and it would be interesting to identify if potential differences relate to demographics, body ideals, and/or other factors that might not have been indicated in the literature. It is imperative that the diagnostic classification system is not beneficial or relevant to one group alone (e.g., the manual should not restrict ED diagnosis to Caucasian cis-gender women).

Age range was individuals 18 and older, with a high number falling between 18-26 years old due to this age group as among the highest treatment-seeking population with ED diagnoses. There was an aspiration of racial stratification per the U.S. Census data to the best of the researcher’s ability (i.e. White non-Hispanic (62.1%), Hispanic (17.4%), African American/Black (13.2%), Asian American (5.4%), 2/+ ethnic groups (2.5%), and American Indian or Alaskan Native (1.2%)) (U.S Census, 2014). The stratification goal was for the possibility to compare the model across groups that have at times been neglected in the creation of diagnostic groups.
Recruitment

Participants were recruited from treatment centers across the U.S. (i.e., Arizona, California, Massachusetts, Pennsylvania, Rhode Island, Connecticut, Missouri, and Colorado). Participants were also recruited with an IRB approved statement (see Appendix II), from treatment-center alumni Facebook groups, treatment-center social-media accounts, the website of the National Eating Disorder Association (NEDA), as well as social-media accounts (i.e. Instagram, Facebook, Twitter, etc.). The survey was included as a shareable link so that the recruitment of participants was also placed in the hands of individuals who were interested in the research study, and who had access to individuals who could participate (e.g., professionals working in community centers that have ED treatment).

This shareable link was provided to individuals who had taken the survey and had knowledge or access to others who were also eligible and interested in participation. It should be noted that some social media accounts shared the link more often than others and higher numbers of specific diagnoses or geographic location might represent those individuals with high numbers of followers (e.g., One particular account was in Canada, so there were quite a few participants from that location).

Measures

IRB approval was sought from the University of Rhode Island. An Informed Consent form was given to all participants (see Appendix III) The anonymous survey included three parts with 67 total items (see Appendix I). The
first part of the survey included 5 items specifically related to demographic information (e.g., gender identity, ethnic identity, geographic location; see Appendix II). The second part included 46 items directly pulled from the DSM-5 with a 5-point Likert scale. The Likert scale answers were used for factor loadings. For example, an individual’s report of often or always for the use of restriction in eating with intention of weight loss would load on the factor AN vs. ARFID, BN, BED, OSFED, or UFED.

The third part of the survey included 16 items about risk factors, shame, past and/or current diagnosis, comorbidity, past treatment, trauma history, treatment providers (e.g., psychologist, psychiatrist or other physician, etc.), level of care (i.e. inpatient, residential, intensive out-patient, or outpatient), remission/recovery and treatment modalities used (e.g. individual therapy, cognitive behavioral therapy, etc.). These final items were used to conduct further analyses to identify if there were a model that might work better when more clinical background information is used rather than sole reliance on the DSM-5 diagnostic features.

Analysis

The EDs were conceptualized as distinct factors that are orthogonal to represent the categorical schema used for diagnosis. Several comparison CFA models, described shortly, were analyzed to verify the nature of EDs. The separation is further emphasized by the ability for a clinician only to diagnose a client with one disorder at a time. A client can be given another diagnosis only if the previous diagnosis is in remission for a specified period, and it cannot occur
within the features of the previous diagnosis (APA, 2013). Due to the EDs separate nature, this investigator conceptualized the EDs as factors to examine model fitness for the factor structure that exists (i.e. DSM-5) as compared to alternative models.

Research has suggested that investigators typically assess social constructs and that particular statistical methods recognize that there is an inherent error in the creation of these items; therefore, multiple items loading are used for each latent factor (e.g., BN has binge-purge cycles, frequency of at least 1 time a week, body satisfaction unduly influenced by weight and/or shape, etc.) (Noar, 2003). Confirmatory factor analysis (CFA) recognizes measurement error (i.e., our measurements are not true-score or perfect representations of these items), allowing an investigator some degree of error in the construction of these factors (Schreiber, Stage, King, Nora, & Barlow, 2006).

The ED diagnoses each represent a factor with diagnostic behavioral item loadings (e.g., BN would have episodes of binge behaviors with the inclusion of purging behaviors). The factors were created with the knowledge that ANr and ARFID have significant overlap but are separated by whether there are body image concerns (APA, 2013). Research has indicated the importance of having multiple items per construct, so the items were carefully chosen from the DSM-5 to load on each specific ED factor (Brown & Moore, 2013; Hoyle, 2000; Noar, 2003; Schreiber, Stage, King, Nora, & Barlow, 2006). For example, binge-only behaviors in an orthogonal CFA model would load specifically on BED and not on any other ED factors.
CFA was used to compare 3 separate nested models. As indicated in Figure 3.1, the first CFA model indicated an orthogonal structure where each factor correlation was set at 0 to indicate no correlations between factors (i.e., categorical diagnosis of EDs); the second model had factor correlations set at 1.0 (i.e. perfectly correlated), where all eating disorders would be subsumed under one broad ED continuum (e.g., one broad ED that explained all EDs). Lastly, there was a freely estimated model that allowed for correlations between factors (i.e., a correlated model). For each factor there must also be at least one factor loading or factor variance that is set at 1.0 to identify factors (Harlow, 2014).

Descriptive statistics including the means, median, standard deviation, skewness, kurtosis, and correlations among the variables were examined. This researcher used the statistical software EQS-6 for the structural-equation modeling with EFA and CFA (Delwiche & Slaughter, 2012) and for descriptive statistics (Bentler, 2006). CFA was used to examine the current structure of ED

Figure 3.1. Illustrates the CFA Models used for the comparison of three separate CFA models (All ED factor covariances set at 1.0., 0, or freely estimated.)
diagnosis on a portion of the sample \((n = 200)\). CFA extends factor analysis by allowing a more rigorous test of the fit of the hypothesized factor model and includes significance tests and loadings for corresponding measures for each factor (Harlow, 2014). Through CFA, variance in factors and residual measurement errors were examined as well as covariance among factors and potentially among residuals. CFA can be used to examine dimensionality of a hypothetical construct through the use of multiple indicators (Hoyle, 2000). In this study, the survey items represented different indicators of a relevant factor.

The assumptions of normality, independence, homoscedasticity, and linear relationships were examined. Data were independent so that no participant was listed on more than one row of the \(n \times q\) matrix (Brown & Moore, 2013; Geldhof, Preacher, & Zyphur, 2014; Harlow, 2014; Hoyle, 2000). Independence was included as part of the survey mechanics so that there would be assurance that individuals could only participate in the survey one time. Examination of possible multicollinearity showed that there were no correlations among variables or factors that were greater than \(r = |.90|\) (Harlow, 2014). Due to the knowledge that the data would likely have non-normal components due to the inclusion of a clinical-only sample, fit indices such as a robust \(\chi^2\) were examined (Brown, 2014; Hoyle, 2000).

Macro assessment included a \(\chi^2\)-test (robust-version if needed). The \(\chi^2\) is a useful indicator of comparison between the three nested models (Hoyle, 2000). Supplemental fit analysis included fit indices to assess root mean square error of approximation (RMSEA) with the expected value to be less than or equal to .10
for acceptable fit; comparative fit index (CFI) would be examined and should be
greater than .90 (Hoyle, 2000). Good fitness, however, was not expected for any
of the three models. Instead, it was expected that as the model moved away from
orthogonal factors, the model would show better fitness.

Micro assessment included z-tests. Factor loadings were examined, and
significance tests were used to verify if all loadings should be retained (Harlow,
2014). Alpha was examined as a reliability indicator; although there are other
reliability measures that are considered to be stronger, research suggests these
differences tend to be minor (Geldhorf, Preacher, & Zyphur, 2014). The retention
of alpha would be important in order to determine internal consistency. Omega
was also considered, however, as this reliability measure might be more
appropriate for this particular CFA due to overlap of symptoms.

The use of EDs as factors with item loadings from the anonymous survey
included items that would likely have loadings on multiple factors but also would
be unlikely to consist of loadings that are equally distributed. Geldhorf et al.
(2014) simply stated that “alpha is only a consistent estimate of reliability only
when all items load on a single construct and when all items represent that
construct equally well (i.e., tau equivalence)” (p. 73). Therefore, examination of
other indicators of internal consistency should be considered. CFA allows for
heterogeneous correlations between factors and the indicators, so composite
reliability (i.e., omega) can be calculated from factor loadings to produce a more
appropriate estimate of reliability for this model (Geldhorf et al., 2014; Revelle &
Zinbarg, 2009). For example, due to the possibility that some of the indicators
such as ED behaviors might load on all factors, and because the severity (e.g., frequency of ED behavior) can vary, the indicators would not be equally distributed on their specific factors.

This researcher predicted that the correlated (i.e., freely estimated or unrestricted) CFA model would have the best fit to the data. This hypothesis was based on the commonly reported overlap among the EDs and the behaviors that are involved in each specific diagnosis. More specifically, it was expected that the correlations between the set ED factors would be high. It also was expected that there would be items that have high loadings on more than one ED factor (e.g., restriction use among AN, ARFID, BN, BED). These high loadings on multiple factors might be explained as symptom comorbidity. As previously stated, issues of comorbidity previously have been considered as contributors to problems with differential diagnosis and treatment selection. Research on the possibility of a single ED that could explain all the EDs has not been validated in past analyses (Uher & Rutter, 2012). This finding supports the hypothesis that there are some differences in EDs that cannot be subsumed in one diagnosis and that the perfectly correlated model would have the worst fit to the data.

Although a one-factor model was predicted to have poor fit to the structure of ED, the single factor model was analyzed as a comparison using the completely correlated model where all factor covariances were set to 1.0 to illustrate that these factors are all the same. If the model fit well, then all EDs could be explained by a single factor. This model was not expected to have good fit based on past research. This researcher presumed that a single-factor model
would not adequately account for the three behaviors often indicated as the behaviors that separate the disorders (i.e., restricting, bingeing, and purging).

As previously stated, the orthogonal model where all factor correlations were set to 0.0 was predicted also to show poor fit due to behavioral overlap, comorbidity, common risk factors, and movement among disorders. The orthogonal model was the model where all factor correlations were set to 0.0. This model was used as a representation of the current DSM-5 model structure of ED diagnosis. Both the orthogonal model and perfectly correlated models were compared to a correlated model where the covariances were allowed to freely estimate. If the correlated model has the best fit it might be evidence for future studies to examine the possibility of a movement towards an EDS. It should be noted that this investigator does not expect any of the models will truly have good fit within a CFA context.

Given the information provided about EDs in terms of symptom overlap and comorbidity, EDs do not appear to fall well into an orthogonal factor structure although the current diagnostic system is conforming to this model. The goal of the EFA and CFA is to show movement towards the best-fit model to indicate that a non-factor model might be the best direction for the future. As previously indicated, the DSM-5 task forces have clearly stated that the future of the DSM will likely be more reliant on dimensional models and taxonomy in conjunction with clinical judgment. If the correlated model has the best fit, it does not suggest that the EDs should be grouped that way, but that there is, in fact, overlap which suggests newer non-orthogonal models could be the future of ED
diagnosis.

Finally, $R$ was used for exploratory data analysis to identify possible overlap indicators and clustering. Exploratory data analysis was used to look at comparisons of shame, clinical features used for diagnosis to compare across EDs, risk factors, and comorbidity. Plotting through this software was done to illustrate behavior clustering as well as distinctions for boundary lines. $K$-nearest neighbors was used to predict more responses and where the overlap and distinction happen between behaviors. $K$-nearest neighbors provided the ability to generate a boundary line between restricting and bingeing behaviors.
Chapter 4

Results

This chapter begins with a demographic description of the participants from the survey. Specifically, information regarding gender identity, SES, and race/ethnicity are provided. Next, univariate statistics from the CFA specific items are provided (mean, skewness, kurtosis, etc.). Following univariate statistics, an explanation of the findings across the three CFA models is provided including a comparison of macro-level fit indicators and goodness-of-fit indices. Next, factor loadings and $r^2$ values are reported to illustrate the accuracy of the items chosen for the CFA ED diagnostic factors. Following the identification of the best-fitting CFA model, post-hoc analysis that was performed is explained to improve model fit to the data. Lastly, exploratory factor analyses are explained to provide further insight into the survey items that might further emphasize the CFA findings, as well as justify a possible reconfiguration of ED diagnostic structure.

Demographics

Participants were mostly female, with 558 individuals reporting a female gender identity. There were 4 males, 11 non-binary/gender-queer participants, and 2 third-gender participants. Table 4.1 provides information about the percentage that each gender identity represented of the total sample. Although extra recruitment was made to reach a more gender-diverse sample, unfortunately there were not many individuals with minority gender identities who completed the survey. Participants were 18 years and over, with a mean of 25.06 years, standard deviation of 6.68 years, variance of 44.61 years, and maximum age of 63 years.
Table 4.1  
*Gender Identity of Sample*

<table>
<thead>
<tr>
<th>Gender Identity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>558</td>
<td>97.04</td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
<td>0.70</td>
</tr>
<tr>
<td>Non-binary/gender queer</td>
<td>11</td>
<td>1.91</td>
</tr>
<tr>
<td>Third gender</td>
<td>2</td>
<td>0.35</td>
</tr>
</tbody>
</table>

SES was explored using educational attainment of both the participant and participant’s parent/guardian. Higher SES was identified as completion of a master’s degree or more. 13.14% of the sample was placed in this group by their own education. Middle SES was identified by bachelor’s degree or more, 31.57% of participants would fall into this category. Lastly, lower SES was identified by completion of either high school diploma/GED, trade school, some college, associate degree. This group made up 55.30% of the sample which was expected given the age of onset for most participants and the interruption of education for possible treatment. The mean of the 2 parent/caregivers was used to determine SES as well. The parent/caregiver SES had a higher percent of higher SES with 25.17%, middle SES was 30.42%, and low SES was 44.51% of the sample.

The sample was also analyzed for race/ethnicity. The majority of the participants (n = 525, 91.30%) reported White race/ethnicity, and 41 participants specified White and not Hispanic or Latino. The next largest group of participants was 48 participants who reported that they identified as Hispanic or Latino, followed by 17 Asian participants, 10 Black/African American participants, 4 American Indian/Alaskan Native, 1 Native Hawaiian/Pacific Islander, and 1
participant who preferred not to answer. There were 12 individuals who selected other and wrote in responses; the majority of these individuals identified better with European (4), Mixed race (5), or Australian (3). Due to the high population of participants who reported White race/ethnicity, the goal of racial stratification per the U.S. Census data was not reached. In addition, the hypothesis regarding racial identity and ED diagnosis was not further explored. Participants also were allowed to select more than one category, which provided additional response sets per participant.

An ED diagnosis was required as a prerequisite to participate in the survey. This diagnosis had to have been either given in the last 5 years or updated from previous diagnoses for those who are still actively in therapy or medicated for their ED. Individuals were required to provide the provider who diagnosed the ED. The providers used must be qualified for ED diagnosis and if an individual selected to write in a provider that was not valid (e.g., not diagnosed or non-licensed mental health provider), they were eliminated from the CFA.

EDs across the groups were not equivalent. ANr had the largest representation with 35.80%, ANbp with 13.90%, BN with 14.10%, BED with 10.10%, OSFED with 14.10%, UFED with 9.60%, and Other with 2.40%. Because ANr and ANbp are both AN, nearly 50% of the sample were in the AN diagnostic group. The sample was much more weighted toward AN than intended; however, due to 44% falling into the other diagnostic groups, there was still a sufficient number of participants for comparison. However, caution was used when generalizing this dataset to the whole population of those with ED.
Univariate Statistics of CFA Items

Univariate statistics were examined to determine normality, homoscedasticity, and linearity. Table 4.2 provides the item that was used for each specific factor, the variable that corresponds, the mean, skewness, and kurtosis per each item. Each item was selected based upon DSM-5 diagnostic criteria for ED factor (e.g., engagement in binge only behaviors was a BED item). It should be noted that there was a high degree of skewness and kurtosis for the different variables. When variables reach values of this magnitude, many researchers choose to perform transformations on the data to assist in providing a more normal distribution. This investigator chose to leave the items as they were due to the nature of the items and responses provided.

Specifically, many individuals endorsed responses in specific item groupings and not others. For example, individuals with ANr had higher ratings on AN items and lower ratings on BED items. All items needed to be answered by all participants; however, many participants either endorsed or did not endorse specific ED behaviors. Therefore, it was also expected that items would be skewed due to specific diagnoses with high response ratings of either engagement or no engagement in the behaviors.

The sample also was largely individuals who represent one factor of participants and was not equally distributed among the factors. To further explain this information, many participants had the diagnosis of AN. These participants diagnosed with AN skewed the restriction items and the items for the other
diagnoses because they likely did not engage in many of the binge-purge or 
binge-only behaviors at the highest response choices. It was important to have the 
participants answer items outside of their diagnosis to identify movement and 
overlap (comorbidity of diagnoses) for this analysis.

Table 4.2
*Univariate Statistics of CFA Items*

<table>
<thead>
<tr>
<th>Item</th>
<th>Survey Quest.</th>
<th>CFA Variable</th>
<th>Mean</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARFID1</td>
<td>16-1</td>
<td>V1</td>
<td>2.3896</td>
<td>0.4311</td>
<td>-1.128</td>
</tr>
<tr>
<td>ARFID2</td>
<td>16-2</td>
<td>V2</td>
<td>2.6574</td>
<td>0.1956</td>
<td>-1.4185</td>
</tr>
<tr>
<td>ARFID3</td>
<td>16-4</td>
<td>V3</td>
<td>1.793</td>
<td>1.1196</td>
<td>0.0568</td>
</tr>
<tr>
<td>ARFID4</td>
<td>16-5</td>
<td>V4</td>
<td>4.0122</td>
<td>-1.0073</td>
<td>0.8735</td>
</tr>
<tr>
<td>BED1</td>
<td>16-3</td>
<td>V5</td>
<td>2.0452</td>
<td>0.9064</td>
<td>-0.681</td>
</tr>
<tr>
<td>BED2</td>
<td>22-2</td>
<td>V6</td>
<td>1.9026</td>
<td>1.1628</td>
<td>0.0672</td>
</tr>
<tr>
<td>BED3</td>
<td>23-2</td>
<td>V7</td>
<td>2.3513</td>
<td>0.4905</td>
<td>-0.7658</td>
</tr>
<tr>
<td>AN1</td>
<td>22-1</td>
<td>V8</td>
<td>4.4261</td>
<td>-1.2974</td>
<td>2.5809</td>
</tr>
<tr>
<td>AN2</td>
<td>22-3</td>
<td>V9</td>
<td>2.6887</td>
<td>0.0712</td>
<td>-1.1617</td>
</tr>
<tr>
<td>AN3</td>
<td>22-4</td>
<td>V10</td>
<td>4.593</td>
<td>-2.0872</td>
<td>4.7959</td>
</tr>
<tr>
<td>AN4</td>
<td>22-5</td>
<td>V11</td>
<td>4.6243</td>
<td>-2.0348</td>
<td>4.4208</td>
</tr>
<tr>
<td>AN5</td>
<td>23-1</td>
<td>V12</td>
<td>3.7965</td>
<td>-0.8535</td>
<td>0.5245</td>
</tr>
<tr>
<td>AN6</td>
<td>23-3</td>
<td>V13</td>
<td>4.3826</td>
<td>-1.422</td>
<td>2.1964</td>
</tr>
<tr>
<td>AN7</td>
<td>23-4</td>
<td>V14</td>
<td>4.1009</td>
<td>-1.1712</td>
<td>1.1222</td>
</tr>
<tr>
<td>AN8</td>
<td>24-2</td>
<td>V15</td>
<td>4.44</td>
<td>-1.364</td>
<td>1.9858</td>
</tr>
<tr>
<td>BN4</td>
<td>29</td>
<td>V16</td>
<td>2.8243</td>
<td>0.0148</td>
<td>-1.2502</td>
</tr>
<tr>
<td>BN5</td>
<td>30</td>
<td>V17</td>
<td>3.3148</td>
<td>-0.4046</td>
<td>-1.3873</td>
</tr>
<tr>
<td>BN1</td>
<td>23-5</td>
<td>V18</td>
<td>2.8296</td>
<td>0.0009</td>
<td>-1.3204</td>
</tr>
<tr>
<td>BN2</td>
<td>24-1</td>
<td>V19</td>
<td>2.647</td>
<td>0.2897</td>
<td>-1.5015</td>
</tr>
<tr>
<td>BN3</td>
<td>27</td>
<td>V20</td>
<td>2.7113</td>
<td>0.1018</td>
<td>-1.3202</td>
</tr>
<tr>
<td>BN3A</td>
<td>28</td>
<td>V21</td>
<td>1.5861</td>
<td>0.5537</td>
<td>-0.4742</td>
</tr>
<tr>
<td>OSFED1</td>
<td>25</td>
<td>V22</td>
<td>2.7722</td>
<td>-0.0032</td>
<td>-1.3613</td>
</tr>
<tr>
<td>OSFED1A</td>
<td>26</td>
<td>V23</td>
<td>1.7374</td>
<td>0.5343</td>
<td>-0.8023</td>
</tr>
<tr>
<td>OSFED2</td>
<td>31</td>
<td>V24</td>
<td>2.5357</td>
<td>0.3693</td>
<td>-1.1041</td>
</tr>
<tr>
<td>OSFED2A</td>
<td>32</td>
<td>V25</td>
<td>1.6661</td>
<td>0.6771</td>
<td>-0.9772</td>
</tr>
</tbody>
</table>
**Confirmatory Factor Analysis**

Table 4.3 provides the 20 largest standardized residuals from the correlated CFA model on the whole sample of \( n = 575 \). Fifteen of the twenty largest standardized residuals exceeded the criterion of \( |.20| \), ranging from .172 to .464. This may have contributed to the overall poor model fit for this CFA model. These results suggest that the relationship between these variables is not adequately explained by the model. Instead of attempting to force fit for parsimony by adding covariance between the residuals, the model was examined to explore the macro-level fit of the data (Harlow, 2014). Table 4.2 provides additional information about each of the parameters compared in Table 4.3 (See Appendix I).

**Table 4.3**

*Largest Standardized Residuals of Correlated CFA Model Using EFA Factors*

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Estimate</th>
<th>No.</th>
<th>Parameter</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V24, V18</td>
<td>0.464</td>
<td>11</td>
<td>V12, V8</td>
<td>0.254</td>
</tr>
<tr>
<td>2</td>
<td>V24, V19</td>
<td>0.428</td>
<td>12</td>
<td>V12, V6</td>
<td>-0.229</td>
</tr>
<tr>
<td>3</td>
<td>V19, V18</td>
<td>0.412</td>
<td>13</td>
<td>V12, V7</td>
<td>-0.22</td>
</tr>
<tr>
<td>4</td>
<td>V22, V18</td>
<td>0.386</td>
<td>14</td>
<td>V18, V4</td>
<td>0.213</td>
</tr>
<tr>
<td>5</td>
<td>V25, V24</td>
<td>0.368</td>
<td>15</td>
<td>V14, V8</td>
<td>0.202</td>
</tr>
<tr>
<td>6</td>
<td>V25, V18</td>
<td>0.354</td>
<td>16</td>
<td>V19, V4</td>
<td>0.187</td>
</tr>
<tr>
<td>7</td>
<td>V23, V18</td>
<td>0.327</td>
<td>17</td>
<td>V18, V14</td>
<td>0.179</td>
</tr>
<tr>
<td>8</td>
<td>V22, V19</td>
<td>0.309</td>
<td>18</td>
<td>V14, V12</td>
<td>0.179</td>
</tr>
<tr>
<td>9</td>
<td>V23, V19</td>
<td>0.299</td>
<td>19</td>
<td>V9, V6</td>
<td>-0.176</td>
</tr>
<tr>
<td>10</td>
<td>V25, V19</td>
<td>0.299</td>
<td>20</td>
<td>V24, V4</td>
<td>0.172</td>
</tr>
</tbody>
</table>

Table 4.3 provides evidence that the CFA models might not be the best fit for the data, due to large residuals. These residuals demonstrate that many of the
factor loadings do not explain the data well and likely do not have good internal consistency. This information also suggests that there are a number of parameters that were not included that should have been. There is also evidence to support that complex loadings might better represent the way that ED diagnostic items load onto many factors. However, due to the study examining the actual model of diagnosis which does not allow for these changes, the model was run without the addition of these parameters.

Table 4.4 is a summary of coefficient alpha calculated for all of the CFA factor loadings. Coefficient alpha provides a measure of internal consistency of these items. AN and BN appear to have the most internal consistency. These EDs have the most diagnostic item questions and have very specific behavioral indicators for diagnosis. Other EDs appear to have more cognitive elements that do not appear to group well together and explain the ED factors. Internal consistency was lower on ARFID, BED, and OSFED and might support that a factor model is not even supported by these findings. However, for the purposes of exploring the DSM-5 model fit to EDs, these analyses were explored to exhaust the possibility of ED structure following a factor structure.

Table 4.4

<table>
<thead>
<tr>
<th>ED Dx</th>
<th>Raw alpha</th>
<th>Std. alpha</th>
<th>Mean corr.</th>
<th>Median corr.</th>
<th>Mean</th>
<th>Std. dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARFID</td>
<td>0.462</td>
<td>0.467</td>
<td>0.180</td>
<td>0.187</td>
<td>2.713</td>
<td>0.774</td>
</tr>
<tr>
<td>AN</td>
<td>0.749</td>
<td>0.787</td>
<td>0.316</td>
<td>0.292</td>
<td>4.135</td>
<td>0.541</td>
</tr>
<tr>
<td>BN</td>
<td>0.873</td>
<td>0.882</td>
<td>0.555</td>
<td>0.537</td>
<td>2.708</td>
<td>1.270</td>
</tr>
<tr>
<td>BED</td>
<td>0.604</td>
<td>0.600</td>
<td>0.333</td>
<td>0.231</td>
<td>2.105</td>
<td>0.977</td>
</tr>
</tbody>
</table>
Table 4.5 is a summary of the macro-level fit across these three models to identify the best-fit model. Initial analyses of the data using univariate statistics as well as preliminary CFA using the first 200 participants were conducted. Three separate models were used for comparison. The perfectly correlated model as expected had poor fit: $\chi^2 (275, n = 200) = 1247.59, p < .0001$, RMSEA = 0.13, CFI = 0.63, 90% CI [0.13, 0.14]. This CFA model had the lowest CFI.

The orthogonal model fit slightly better than the perfectly correlated model with CFI of .73. The correlated model had slightly improved fit compared to the orthogonal model with: $\chi^2 (275, n = 200) = 994.73, p < .0001$, RMSEA = 0.12, CFI = 0.73, 90% CI [0.11, 0.12]. The correlated CFA model offers again improved fit to the data with: $\chi^2 (265, n = 200) = 901.45, p < .0001$, RMSEA = 0.11, CFI = 0.76, 90% CI [0.10, 0.12]. It should be noted that none of the models provide a good fit for the data. The $\chi^2$ is too large, the CFI does not reach 0.90 for good fit, and the root mean square error of approximation (RMSEA) is larger than the 0.10 level of adequate fit (Bentler, 1980; Steiger & Lind, 1980). The only model that has a 90% CI that has one number within an acceptable bound is the correlated CFA model. All models indicate a significant $p$-value, which is not ideal. Similarly, as previously stated, none of the models have indicators of good fit for the data.

The uncorrelated model offers improved fit as compared to the perfectly correlated model, with a $\chi^2$ difference of 253.85 compared to the perfectly correlated model. The correlated model offers the best fit for the three models.
evaluated by the initial CFA. Although the $\chi^2$ is still too large, $p$-value significant, and the RMSEA still falls slightly above the .10 level, this model still illustrates better fit to the data than the perfectly correlated or uncorrelated models. This model improved the fit with a $\chi^2$ difference of 93.29, there were fewer degrees of freedom for this model, and although the RMSEA was 0.11, the lower bound of the 90% CI for the RMSEA fell within an acceptable limit at 0.10.

The investigator did not expect any of the models to have acceptable fit; however, it was expected that neither the perfectly correlated or uncorrelated models would have the best fit to the data. This expectation was due to a comprehensive review of the literature that indicated behavior/symptom overlap, as well as the DSM-5 suggestion that future diagnosis rests on dimensional models that include both statistical taxonomy in addition to the diagnostic features that have been indicated for disorders.

Table 4.5
Macro-level Fit for Three CFA Models Using Pre-EFA factors, $n = 200$

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$p$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>90% CI</th>
<th>$\chi^2_{\text{diff}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perf Corr CFA</td>
<td>1247.591</td>
<td>275</td>
<td>&lt;0.001</td>
<td>0.631</td>
<td>0.133</td>
<td>[0.126, 0.140]</td>
<td></td>
</tr>
<tr>
<td>Uncorr CFA</td>
<td>994.734</td>
<td>275</td>
<td>&lt;0.001</td>
<td>0.727</td>
<td>0.115</td>
<td>[0.107, 0.122]</td>
<td>252.857</td>
</tr>
<tr>
<td>Corr CFA</td>
<td>901.446</td>
<td>264</td>
<td>&lt;0.001</td>
<td>0.758</td>
<td>0.110</td>
<td>[0.102, 0.118]</td>
<td>93.288</td>
</tr>
</tbody>
</table>

Table 4.6 provides macro-level fit information for the previous three models using CFA but conducted on the entire data set of 575 participants. It
should be noted that similar to the initial CFA, none of the models provided a good fit, yet model fit improved with the correlated CFA model, indicating that the data had a better fit when allowed to freely correlate among the factors and covariances. Similar to the initial CFAs, on the first 200 participants the perfectly correlated CFA model had the worst fit to the data. The uncorrelated CFA model improved fit with: $\chi^2 (265, n = 200) = 2473.47, p < .0001$, CFI = 0.72, RMSEA = 0.12, 90% CI [0.11, 0.12]. This uncorrelated CFA model had a $\chi^2$ difference of 600.0. Similar to the other CFA analyses, the $p$-value was significant, which is not favored; however, in samples over 200, it can be quite common (Harlow, 2014).

As seen in the initial CFAs, the correlated CFA model conducted on the entire sample showed improved fit with: $\chi^2 (265, n = 577) = 2224.34, p < .0001$, CFI = 0.75, RMSEA = 0.11, 90% CI [0.11, 0.12]. Compared to the uncorrelated CFA model, there was a $\chi^2$ difference of 249.13. As previously mentioned, the $p$-value was significant, which is common for samples of this size.

The next analysis that was performed was an EFA with a follow-up CFA on the second 200 participants. This EFA indicated a correlated model fit best and determined specific variables that would be better labeled under different factors. Once these changes were made, the new correlated CFA was conducted on the last 175 participants as well as on the whole sample using these new variables for factor loadings. This new, correlated CFA model on the whole sample with the new factors improved the fit to the data slightly with: $\chi^2 (265, n = 575) = 1844.24, p < .0001$, CFI = 0.80, RMSEA = 0.10, 90% CI [0.10, 0.11].

Compared to the initial correlated CFA model with the original variables
loading on each factor, the new arrangement of variables produced a $\chi^2$ difference of 380.10. As with all the other CFA models conducted, the $p$-value was still significant, but the sample size might have led to that occurrence. Although the CFI was not adequate for good fit, it was improved, and the RMSEA was within an acceptable limit at the .10 level. The 90% CI of the RMSEA was within an acceptable lower limit bound.

Table 4.6
Macro-level Fit for Three CFA Models Using Pre-EFA Factors and One CFA Model Using EFA Factors, $N = 577$

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$p$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>90% CI</th>
<th>$\chi^2_{diff}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perf Corr CFA</td>
<td>3073.503</td>
<td>275</td>
<td>&lt;0.001</td>
<td>0.642</td>
<td>0.133</td>
<td>[0.129, 0.137]</td>
<td></td>
</tr>
<tr>
<td>Uncorr CFA</td>
<td>2473.466</td>
<td>275</td>
<td>&lt;0.001</td>
<td>0.718</td>
<td>0.118</td>
<td>[0.114, 0.122]</td>
<td>600.037</td>
</tr>
<tr>
<td>Corr CFA</td>
<td>2224.338</td>
<td>265</td>
<td>&lt;0.001</td>
<td>0.749</td>
<td>0.113</td>
<td>[0.109, 0.118]</td>
<td>249.128</td>
</tr>
<tr>
<td>Corr CFA (EFA factors)</td>
<td>1844.237</td>
<td>265</td>
<td>&lt;0.001</td>
<td>0.798</td>
<td>0.102</td>
<td>[0.097, 0.106]</td>
<td>380.101</td>
</tr>
</tbody>
</table>

Table 4.7 provides the macro-level fit summaries for the different fit indices that were provided from the EQS output. This table was generated from the correlated CFA models. As previously stated, there was not good fit to the data, but some indicators were within acceptable limits, and the fit was improved in the correlated models as compared to both the perfectly correlated and uncorrelated CFA models. The improved fit of the correlated model to the data provided some evidence to support the ED behavioral overlap through the use of
Table 4.7
Macro-level Goodness of Fit Summary for Correlated CFA Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Corr CFA, N=200</th>
<th>Corr CFA, N=577</th>
<th>Corr CFA, N=577 (EFA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>ML</td>
<td>ML</td>
<td>ML</td>
</tr>
<tr>
<td>Model AIC</td>
<td>373.446</td>
<td>1694.338</td>
<td>1314.237</td>
</tr>
<tr>
<td>Model CAIC</td>
<td>-761.309</td>
<td>275.43</td>
<td>-104.671</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td>901.446</td>
<td>2224.338</td>
<td>1844.237</td>
</tr>
<tr>
<td>df</td>
<td>264</td>
<td>265</td>
<td>265</td>
</tr>
<tr>
<td>Probability Value</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
</tr>
<tr>
<td>Normal Theory RLS $\chi^2$</td>
<td>940.445</td>
<td>2260.967</td>
<td>1876.903</td>
</tr>
<tr>
<td>Bentler-Bonett Normed Fit Index</td>
<td>0.693</td>
<td>0.726</td>
<td>0.773</td>
</tr>
<tr>
<td>Bentler-Bonett Non-Normed Fit Index</td>
<td>0.725</td>
<td>0.716</td>
<td>0.771</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>0.758</td>
<td>0.749</td>
<td>0.798</td>
</tr>
<tr>
<td>Bollen's (IFI) Fit Index</td>
<td>0.761</td>
<td>0.75</td>
<td>0.799</td>
</tr>
<tr>
<td>McDonald's (MFI) Fit Index</td>
<td>0.203</td>
<td>0.182</td>
<td>0.253</td>
</tr>
<tr>
<td>Jöreskog-Sörbom's GFI Fit Index</td>
<td>0.726</td>
<td>0.76</td>
<td>0.793</td>
</tr>
<tr>
<td>Jöreskog-Sörbom's AGFI Fit Index</td>
<td>0.662</td>
<td>0.706</td>
<td>0.746</td>
</tr>
<tr>
<td>Root Mean-Square Residual (RMR)</td>
<td>0.206</td>
<td>0.214</td>
<td>0.183</td>
</tr>
<tr>
<td>Standardized RMR</td>
<td>0.121</td>
<td>0.118</td>
<td>0.093</td>
</tr>
<tr>
<td>Root Mean-Square Error of Approx. (RMSEA)</td>
<td>0.110</td>
<td>0.113</td>
<td>0.102</td>
</tr>
<tr>
<td>90% Confidence Interval of RMSEA</td>
<td>[0.102, 0.118]</td>
<td>[0.109, 0.118]</td>
<td>[0.097, 0.106]</td>
</tr>
</tbody>
</table>

Table 4.8 shows each variable and its loading, factor identified for loading, error, and $r^2$. The loadings for all of the variables were almost all above .40 with only one falling below with ARFID1 only having a 0.194 loading. This variable was not removed due to the low number of ARFID items. These items needed to be used as comparison against AN as well. All items were retained from the original CFA models. The only changes made to the model were based upon the covariance between factors.
EFA model indicating a few variables loaded on separate factors. Due to high overlap between ARFID and AN, there was separation of ANr/ARFID and ANbp identified within the factors.

Table 4.8
Factor Loadings and $r^2$ for Correlated CFA Model Using EFA Factors
Equation: $X = \lambda \xi + \delta$

<table>
<thead>
<tr>
<th>Item/ Variable (X)</th>
<th>Loading ($\lambda$)</th>
<th>Latent Factor ($\xi$)</th>
<th>Error ($\delta$)</th>
<th>$r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARFID1</td>
<td>0.194</td>
<td>F4</td>
<td>0.981</td>
<td>0.037</td>
</tr>
<tr>
<td>ARFID2</td>
<td>0.45</td>
<td>F4</td>
<td>0.893</td>
<td>0.203</td>
</tr>
<tr>
<td>ARFID3</td>
<td>0.525</td>
<td>F4</td>
<td>0.851</td>
<td>0.276</td>
</tr>
<tr>
<td>ARFID4</td>
<td>0.436</td>
<td>F4</td>
<td>0.9</td>
<td>0.19</td>
</tr>
<tr>
<td>BED1</td>
<td>0.721</td>
<td>F5</td>
<td>0.693</td>
<td>0.519</td>
</tr>
<tr>
<td>BED2</td>
<td>0.756</td>
<td>F5</td>
<td>0.655</td>
<td>0.572</td>
</tr>
<tr>
<td>BED3</td>
<td>0.423</td>
<td>F1</td>
<td>0.906</td>
<td>0.179</td>
</tr>
<tr>
<td>AN1</td>
<td>0.589</td>
<td>F4</td>
<td>0.808</td>
<td>0.346</td>
</tr>
<tr>
<td>AN2</td>
<td>0.718</td>
<td>F4</td>
<td>0.696</td>
<td>0.516</td>
</tr>
<tr>
<td>AN3</td>
<td>0.803</td>
<td>F3</td>
<td>0.595</td>
<td>0.646</td>
</tr>
<tr>
<td>AN4</td>
<td>0.786</td>
<td>F3</td>
<td>0.618</td>
<td>0.618</td>
</tr>
<tr>
<td>AN5</td>
<td>0.402</td>
<td>F3</td>
<td>0.916</td>
<td>0.162</td>
</tr>
<tr>
<td>AN6</td>
<td>0.703</td>
<td>F3</td>
<td>0.711</td>
<td>0.494</td>
</tr>
<tr>
<td>AN7</td>
<td>0.643</td>
<td>F3</td>
<td>0.766</td>
<td>0.413</td>
</tr>
<tr>
<td>AN8</td>
<td>0.771</td>
<td>F3</td>
<td>0.637</td>
<td>0.594</td>
</tr>
<tr>
<td>BN4</td>
<td>0.893</td>
<td>F1</td>
<td>0.449</td>
<td>0.798</td>
</tr>
<tr>
<td>BN5</td>
<td>0.83</td>
<td>F1</td>
<td>0.558</td>
<td>0.689</td>
</tr>
<tr>
<td>BN1</td>
<td>0.606</td>
<td>F1</td>
<td>0.796</td>
<td>0.367</td>
</tr>
<tr>
<td>BN2</td>
<td>0.632</td>
<td>F1</td>
<td>0.775</td>
<td>0.399</td>
</tr>
<tr>
<td>BN3</td>
<td>0.953</td>
<td>F1</td>
<td>0.303</td>
<td>0.908</td>
</tr>
<tr>
<td>BN3A</td>
<td>0.9</td>
<td>F1</td>
<td>0.436</td>
<td>0.81</td>
</tr>
<tr>
<td>OSFED1</td>
<td>0.93</td>
<td>F2</td>
<td>0.366</td>
<td>0.866</td>
</tr>
<tr>
<td>OSFED1A</td>
<td>0.904</td>
<td>F2</td>
<td>0.428</td>
<td>0.817</td>
</tr>
<tr>
<td>OSFED2</td>
<td>0.686</td>
<td>F2</td>
<td>0.728</td>
<td>0.47</td>
</tr>
<tr>
<td>OSFED2A</td>
<td>0.649</td>
<td>F2</td>
<td>0.761</td>
<td>0.421</td>
</tr>
</tbody>
</table>
Post-hoc Analysis

Once the correlated CFA was identified as the best fit to the data, the investigator attempted to improve the fit using Bagozzi et al.’s (1991) discriminant-validity test. The discriminant-validity test assists in the identification of any constructs measuring the same items by looking at the phi matrix using the formula: parameter estimate (phi value) ± 1.96 × standard error (Hooper, Couglan, & Mullen, 2008). If it was expected that this correlated CFA model would have a good fit for ED diagnosis, these values could be used to delete items that overlap.

As previously discussed, however, the correlated CFA model was not expected to represent the best model of future ED diagnosis. Instead, this model was used to show that there was covariance between EDs. This covariance may help to explain the problem that arises out of the DSM-5 separation of these disorders as mutually exclusive. It appears that the separate structure of EDs loses useful information about how EDs truly occur. Table 4.6 illustrates the items that were indicated for deletion from the CFA using the discriminant validity test. These items, however, were taken from the DSM-5 for ED diagnosis. It is an interesting finding to observe the number of items from each ED diagnosis that were measuring a similar construct as a separate ED diagnosis.

Table 4.9
Bagozzi Discriminant Validity Test for Improved Fit of Correlated CFA Model Using EFA Factors

<table>
<thead>
<tr>
<th>Var. 1, Var. 2</th>
<th>(+)</th>
<th>(-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARFID2, ARFID1</td>
<td>1.12516</td>
<td></td>
</tr>
<tr>
<td>OSFED2A, ARFID3</td>
<td>1.10936</td>
<td></td>
</tr>
<tr>
<td>Var. 1, Var. 2</td>
<td>(+)</td>
<td>(-)</td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>BN5, BED2</td>
<td>1.04304</td>
<td></td>
</tr>
<tr>
<td>BN5, BED3</td>
<td>1.05172</td>
<td></td>
</tr>
<tr>
<td>BN5, BN4</td>
<td>2.7044</td>
<td>2.1556</td>
</tr>
<tr>
<td>BN1, BN4</td>
<td>1.10216</td>
<td>1.01984</td>
</tr>
<tr>
<td>BN2, BN4</td>
<td>1.3354</td>
<td>1.1786</td>
</tr>
<tr>
<td>BN3, BN4</td>
<td>1.56128</td>
<td>1.58872</td>
</tr>
<tr>
<td>BN3A, BN4</td>
<td>1.35192</td>
<td>1.54008</td>
</tr>
<tr>
<td>BN1, BN5</td>
<td>1.79068</td>
<td>1.56332</td>
</tr>
<tr>
<td>BN2, BN5</td>
<td>1.91768</td>
<td>1.88632</td>
</tr>
<tr>
<td>BN3, BN5</td>
<td>2.42256</td>
<td>2.47744</td>
</tr>
<tr>
<td>BN3A, BN5</td>
<td>2.04384</td>
<td>2.42016</td>
</tr>
<tr>
<td>OSFED2, BN5</td>
<td>1.3124</td>
<td></td>
</tr>
<tr>
<td>OSFED2A, BN5</td>
<td>1.11708</td>
<td></td>
</tr>
<tr>
<td>BN2, BN1</td>
<td>3.60096</td>
<td></td>
</tr>
<tr>
<td>OSFED1, BN1</td>
<td>2.27632</td>
<td></td>
</tr>
<tr>
<td>OSFED1A, BN1</td>
<td>2.15496</td>
<td></td>
</tr>
<tr>
<td>OSFED2, BN1</td>
<td>2.62952</td>
<td></td>
</tr>
<tr>
<td>OSFED2A, BN1</td>
<td>2.93344</td>
<td></td>
</tr>
<tr>
<td>BN3, BN1</td>
<td>1.18716</td>
<td></td>
</tr>
<tr>
<td>BN3A, BN1</td>
<td>1.10788</td>
<td></td>
</tr>
<tr>
<td>BN3, BN2</td>
<td>1.04556</td>
<td>1.39444</td>
</tr>
<tr>
<td>BN3A, BN2</td>
<td>1.18568</td>
<td>1.25232</td>
</tr>
<tr>
<td>OSFED1, BN2</td>
<td>2.04644</td>
<td></td>
</tr>
<tr>
<td>OSFED1A, BN2</td>
<td>2.21024</td>
<td></td>
</tr>
<tr>
<td>OSFED2, BN2</td>
<td>2.71636</td>
<td></td>
</tr>
<tr>
<td>OSFED2A, BN2</td>
<td>2.77756</td>
<td></td>
</tr>
<tr>
<td>BN3A, BN3</td>
<td>1.73232</td>
<td>1.56768</td>
</tr>
<tr>
<td>OSFED1A, OSFED1</td>
<td>1.96052</td>
<td>1.81548</td>
</tr>
<tr>
<td>OSFED2, OSFED1</td>
<td>1.07184</td>
<td>1.25216</td>
</tr>
<tr>
<td>OSFED2A, OSFED1</td>
<td>1.304</td>
<td>1.794</td>
</tr>
<tr>
<td>OSFED2, OSFED1A</td>
<td></td>
<td>1.41756</td>
</tr>
<tr>
<td>OSFED2A, OSFED1A</td>
<td>1.48548</td>
<td>1.92452</td>
</tr>
<tr>
<td>OSFED2A, OSFED2</td>
<td>4.08976</td>
<td></td>
</tr>
</tbody>
</table>
Exploratory Data Analysis

Diagnostic Movement

Further analysis of the responses to the survey was performed using the R statistical computing software is presented in the remainder of this chapter. To illustrate the changes in ED diagnosis over time (i.e., diagnostic movement), Figure 4.1 utilizes a pair of two-dimensional histograms comparing the original ED diagnosis and current ED diagnosis of each respondent, Item #13 (“My first Eating Disorder diagnosis was”) and Item #14 (“My current or most recent Eating Disorder diagnosis is”), respectively. Similar to the bars of a traditional one-dimensional histogram, the tiles within a two-dimensional histogram represent the number of responses for a given pair of items; the color of each tile is representative of the number of responses.

Figure 4.1. Movement between EDs over time through a comparison of orthogonal model (a) lack of movement from original diagnosis (dx) compared to (b) the actual data of original dx versus current dx.

For the purpose of comparative visualization, Figure 4.1a illustrates the
fictitious case of no diagnostic movement, where the current ED diagnosis has been manually reassigned to be equal to the original ED diagnosis from the survey. Figure 4.1a is provided to show the contrast between the case of invariant diagnosis with respect to time and the hypothesis that for many individuals with EDs, the behaviors and actual ED diagnosis often change over time. As such, Figure 4.1a is a direct comparison to Figure 4.1b, which shows the actual diagnoses (original and current) as reported by the respondents.

In contrast to the fictitious visualization presented in Figure 4.1a, the actual diagnoses plotted in Figure 4.1b provide support for reported concerns of ED clinicians related to diagnostic movement. Figure 4.1b illustrates the true movement that exists in this population sample. If ED diagnosis were separate and distinct disorders, it is unlikely there would be individuals reporting changes to their diagnosis over time. It is possible that there were issues with the original diagnosis, and that a provider later redefined the diagnosis as a different ED. As previously stated, however, issues with differential diagnosis have been an indicator used for the reconfiguration of ASD that might justify a similar reconfiguration with ED, possibly EDS.

*Fear of “Fatness” Comparison*

Another area of the survey that was explored was the comparison across disorders of fear of “fatness.” This specific item was of particular importance to explore an issue that is currently used in the DSM-5 as a clinical feature of a particular diagnosis, in this case AN. This item 22-4 “I have a fear of becoming fat,” was used to configure Figure 4.2. Figure 4.2 is a two-dimensional histogram
using the Likert scale ratings of item 22-4, to compare the ratings on this item across ED diagnoses. Darker “tiles” indicate fewer respondents. Although the highest ratings were among ANr, this finding has a direct relationship to the number of respondents with this diagnosis who participated in this survey.

![Fear of “Fatness” across ED diagnoses.](image)

Figure 4.2. Fear of “Fatness” across ED diagnoses.

An interesting finding is the observation of the high ratings of this item across all EDs. As previously mentioned, this item is a diagnostic clinical feature for AN. Figure 4.2, however, highlights BN as the group that actually has the highest ratings for this item, with no individuals reporting either of the two lowest Likert scale ratings. In Figure 4.2, although the BED group appears to have the lowest ratings of fear of “fatness,” the highest number of respondents still falls within the high and mid-high ratings on this item. It might be predicted that BED would have the lowest ratings of this item due to the weight range that most
individuals with BED typically fall into due to repeated binge behaviors.

*Sexual Violence*

Dissimilar to the item used in the analysis of fear of “fatness” across EDs, where the item was a diagnostic feature for an ED, sexual violence is not an item that is currently used in the *DSM-5* for ED diagnosis. Reported sexual violence, however, differs across diagnoses and many individuals with EDs have experienced sexual violence. The analysis of item, 42-5, “During my lifetime I have experienced sexual violence (e.g., I was raped, sexually abused, coerced sexually, etc.)” was used to identify if sexual violence was present or not. Individuals who reported Likert ratings of 1 to 3 (i.e., agree, somewhat agree, and strongly agree) were coded as having experienced sexual violence and all others were coded as no sexual violence. Figure 4.3 provides a visual representation from the analysis of item 42-5, which compares sexual violence and no sexual violence across EDs.

*Figure 4.3.* Comparison of the risk factor sexual violence and no sexual violence across ED diagnoses.
Here, 54 percent of the participants reported sexual violence, and there were 46 percent who had no history of sexual violence with the same diagnoses. This analysis provides interesting information about prevalence of sexual violence differences among EDs. Figure 4.3 shows that respondents in the ANr diagnostic group had an almost equal number of participants responding with no history of sexual violence as those who reported a history of sexual violence. This finding in the ANr diagnostic group contrasts with the respondents in the other diagnostic groups that had a much higher percentage of individuals reporting a history of sexual violence compared to no reported history of sexual violence.

Figure 4.3 assists in differentiating risk a bit further; it appears that a history of sexual violence is more likely in EDs with more than one behavior used. This finding is emphasized by ANr and BED having lower reported sexual violence compared to ANbp, BN, OSFED, and UFED. This difference might be useful to consider why individuals might engage in particular behaviors and to identify which EDs an individual might be more likely to show given a history of specific risk factors. Quite possibly, other indicators such as parental history of specific ED, childhood obesity, parental obesity, or childhood malnutrition might be specific risk factors that could be related to specific diagnosis.

**Comorbidity**

Comorbidity was explored to identify whether there were differences between ED diagnoses and co-occurring disorders. 82% of the participants from the survey indicated one or more comorbid psychological disorders placing them in the comorbidity group in Figure 4.4. Those who did not report comorbid
disorders were placed into the no-comorbidity group. Each individual was required to list each comorbid psychological disorder. If an individual listed a medical/health condition, this item was not included in the count of comorbidity. The third axis in Figure 4.4 shows percentage of respondents per ED diagnosis. This axis illustrates that there was a high percentage of individuals with comorbid disorders, but that existence of comorbidity alone was not differentiated across ED diagnosis. It is possible there are groupings that could be identified using specific disorders that an individual endorses. The “other” category is the exception to the even distribution of comorbidity; however, there were very few individuals that fell into this group and it is likely less representative of comorbidity in ED. The majority of individuals in the other category lived outside of the U.S. and had a diagnosis of orthorexia.

![Graph showing comparison of comorbidity and no comorbidity across ED diagnoses.](image)

*Figure 4.4. Comparison of comorbidity and no comorbidity across ED diagnoses.*

**Shame**

As previously discussed, shame has been identified as an area that warrants further exploration. It was hypothesized that shame might be related to
specific ED diagnosis. Specifically, it was anticipated that there would be less shame within the AN group, specifically ANr. This hypothesis was based on a comprehensive review of the literature and statistical findings that suggest that ANr clusters more similarly with normal eating and dieting. Due to restriction falling on a continuum of normal, disordered, and ED, there is typically less stigma associated with that diagnosis.

![Occurrence of Shame](image)

*Figure 4.5. Comparison of shame scores across EDs where AN restricting type is compared to all other non-AN restricting type to identify if the addition of bingeing and purging relates to reported shame.*

Occurrence of shame is an aggregate mean rating of shame based on the 5-point Likert scale from the survey. Through exploratory data analysis it appeared that shame did, in fact, separate ANr from all non-ANr diagnoses in that comparatively, ANr had fewer individuals reporting high ratings of shame (i.e., ratings of “often” or “always”) compared to all individuals in the non-ANr diagnosis group. When observing low ratings of shame (i.e., “never,” “rarely,” “sometimes”), respondents with a current ED diagnosis of ANr had higher ratings
than those in the non-ANr category. Figure 4.4 illustrates these findings based on the respondents from the ED survey. The combination of all non-ANr provided a more equal comparison of groups due to the ANr category having the most participants. Shame appeared to be an important separation between ANr and all other EDs. It appears that the addition of binge/purge behaviors alters shame.

Eating Disorder Behaviors

Behaviors are an important indicator that seem to differentiate ED diagnosis using the DSM-5. An analysis of the item 33-2, “During the illness (past or present) I engaged in behaviors that are typically seen in eating disorders OTHER than the one that I was diagnosed,” identified participants engaged in behaviors outside of their ED diagnosis. Figure 4.6 illustrates movement among EDs. Movement can partially explain engagement in behaviors outside of an individual’s ED diagnosis.

![Graph](image)

*Figure 4.6. Engagement in behaviors outside of ED diagnosis across ED diagnoses.*
Figure 4.6 compares respondents who reported engagement in behaviors outside of ED diagnosis to respondents who reported that they never/rarely engaged in behaviors outside of ED diagnosis. Interestingly, individuals with a diagnosis involving one behavior were almost equally likely to not engage in behaviors outside of their diagnosis compared to those who had a diagnosis involving more than one behavior, who were more likely engaging in behaviors outside of their diagnostic-specific behaviors. Specifically, ANr and BED had more similar respondents who engaged or did not engage in behaviors outside of ED diagnosis. Figure 4.6 also provides information about total participants engagement in outside behaviors, with 63 percent of individuals endorsing engagement in these non-diagnostic specific behaviors.

*Behavior Clustering*

As previously emphasized, behaviors are an important feature of ED diagnosis. It is important to remember the CFA results indicated some overlap through covariance between factors and the correlated model had the best fit to the data. These results are further supported by a comparison of the two behaviors that are thought to be the most distinct on the continuum of disordered eating behaviors (i.e., bingeing and restricting). To compare these two behaviors, specific items were chosen from the survey that correspond to the CFA factor items for ANr and BED. These items were chosen from *DSM-5* diagnostic criteria for these ED diagnoses.

In Figure 4.7a the numeric mean of the item responses was used for each of the categories of restricting and bingeing items (see Appendix I for response
ratings). These means were then compared across respondents who indicated a current ED diagnosis of ANr and BED. Conceptually, if a respondent answered all of the ANr items with high ratings, one would have increased confidence in the accuracy of the current ANr diagnosis. If the current diagnostic structure were adequate in capturing individual experience, it would be expected that individual respondents with ANr would have no overlap with respondents with BED, seen through responses to the restricting and bingeing items. Although there are some individuals, however, with ANr diagnosis who responded high on all restricting items and low on all bingeing items, this response type was not seen in all respondents. In fact, many individuals with a diagnosis of BED reported high ratings on both bingeing and restricting items. Figure 4.7a includes cognitive elements within the DSM-5 diagnostic criteria for AN (e.g., fear of weight gain, fear of fatness, etc.).

![Figure 4.7a](image.png)

![Figure 4.7b](image.png)

**Figure 4.7.** ED behavior clustering and boundary line. These figures illustrate a comparison of respondents with a diagnosis of ANr compared to respondents with a diagnosis of BED using the mean responses for all restricting and bingeing only items. Projection of responses were generated using k-nearest neighbors and a boundary line was used where k = 5. a) compares DSM-5 restricting items including both behavior and cognitive elements of diagnosis compared to b) which compares the behaviors without cognitive elements.
Table 4.10
*K-Nearest Neighbors Predicted Classification for Figure 4.7. \( C_{\text{max}} = 78.2\% \).*

<table>
<thead>
<tr>
<th>Predicted Dx</th>
<th>Actual Dx, Bx Only</th>
<th>Actual Dx, w/ Cognitions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANR</td>
<td>BED</td>
</tr>
<tr>
<td>ANR</td>
<td>198</td>
<td>11</td>
</tr>
<tr>
<td>BED</td>
<td>6</td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hit Rate</td>
</tr>
<tr>
<td>93.5%</td>
</tr>
</tbody>
</table>

When compared through exploratory data analysis, these responses were plotted to identify clustering. In Figure 4.7a, a small degree of random noise was added to each data point to separate overlapping data points to better visualize the data distribution (Wickham & Grolemund, 2016). In Figure 4.7a, the actual survey responses are the large circles. After the responses were plotted, \( k \)-nearest neighbors (\( k = \) number of training samples near each point) was the method used to project a larger number of responses using the survey respondent's data (see Table 4.9). The classification hit rate was 93.5\% compared to a maximum-chance criterion (i.e., probability of actual ANr diagnosis) of 78.2\% in this sample. A boundary line was generated using \( k = 5 \). To reiterate, if the current diagnostic structure were correct, it would be expected that the generated behavioral clusters would not overlap but would separately group. There is overlap in Figure 4.7a, however, and some of the most interesting items that can be posed would be surrounding those participants who fall outside of that boundary line, as well as why the shape of the boundary line appears as it does.
Figure 4.7b illustrates the same comparison between a numeric mean of diagnostic items for both ANr and BED. This analysis, however, was completed with the removal of all cognitive diagnostic elements to identify if overlap is seen more between behaviors or cognitions. Similar to Figure 4.7a, bingeing and restricting means across respondents were compared for those respondents who indicated a current diagnosis of ANr and BED. In Figure 4.7b, a shift occurs in the respondent means across behaviors. The classification hit rate decreases negligibly from 93.5% to 92.3% accuracy of correct ED prediction, the maximum-chance criterion (C_max) of an ANr diagnosis in this sample is 78.2% (see Table 4.10).

The exploratory data analysis on this behavioral clustering provided justification to explore other ED behaviors. A comparison of binge/purge behaviors and restricting behaviors was done both with cognitive diagnostic elements and without cognitive diagnostic elements. This analysis was done to identify overlap as well as to identify if more separation is seen through behaviors alone. Similar to Figure 4.7a and Figure 4.7b, Figure 4.8a and Figure 4.8b also were generated using the numeric mean of the ED diagnostic items for ANr for restricting behaviors. The difference in Figure 4.8a and Figure 4.8b is that for binge/purge behaviors, all binge/purge, binge, and purge items were used for comparison. The mean responses for these behaviors were then compared across those diagnosed with ANr and those diagnosed with ANbp/BN. ANbp and BN were combined due to the significant overlap that occurred when they were kept apart. These ED diagnoses did not appear to have any separation and included the
same numeric mean responses.

Figure 4.8. ED behavior clustering and boundary line. These figures illustrate a comparison of respondents with ANr and BN/ANbp diagnoses using the mean responses for restricting and all binge/purge, binge, and purge items. Projection of responses were generated using k-nearest neighbors and a boundary line was used where \( k = 10 \). a) compares DSM-5 restricting items including both behavior and cognitive elements of diagnosis compared to b) which compares the same behaviors without cognitive elements.

Table 4.11

K-Nearest Neighbors Predicted Classification for Figure 4.8. \( C_{\text{max}} = 55.8\% \).

<table>
<thead>
<tr>
<th></th>
<th>Actual Dx, Bx Only</th>
<th>Actual Dx, w/ Cognitions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANR</td>
<td>BN/ANBP</td>
</tr>
<tr>
<td>Predicted Dx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANR</td>
<td>166</td>
<td>21</td>
</tr>
<tr>
<td>BN/ANBP</td>
<td>36</td>
<td>139</td>
</tr>
<tr>
<td>Classification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hit Rate</td>
<td>84.3%</td>
<td>81.2%</td>
</tr>
</tbody>
</table>

Figure 4.8a was generated using both behavior and cognitive elements. This figure also used k-nearest neighbors to generate responses and a boundary line using \( k=10 \). In Figure 4.8a the classification hit rate was 81.2\%. When the cognitive items were removed from the aggregate mean responses, the
classification hit rate rose to 84.3% accuracy with a $C_{\text{max}}$ of 55.8% in ED diagnosis prediction (see table 4.11). Similar to Figure 4.7a and Figure 4.7b, these figures also provide evidence of overlap and evidence for more distinction between high ratings on specific behaviors per ED diagnosis. Figure 4.8a and Figure 4.8b demonstrate more overlap than was seen in the previous behavioral clustering. This increased overlap was predicted and explained in the justification for an EDS in Chapter 1, where more similarities were expected between ANr and ANbp with BN as compared to ANr and BED.

Summary

This chapter explained the results of an analysis of the online ED survey. The demographics of the sample were reviewed, with the majority of the sample identified as female, low to middle class SES, and identified as White race/ethnicity. Univariate statistics were explained for the items selected for the CFA. These items represented diagnostic criteria from the DSM-5. Univariate statistics showed high levels of skewness and kurtosis that are explained by the respondents with different ED diagnoses answering all of the items on the ED survey. Internal consistency was explored through the calculation of coefficient alpha for all of the ED factor loadings.

These ratings suggest that AN and BN have the best internal consistency, but that most of the EDs have poor consistency of item loadings onto ED factors. The combination of alpha and high residuals suggests that a better factor model would include more parameters and complex factor loadings to allow for more overlap of loadings onto multiple factors due to behavioral overlap of EDs. Due to
the study goal of examining the current structure of ED diagnosis using the *DSM-5*, changes could not be made to the item loadings or factor structure.

Next, CFA results were provided for the initial analyses on the first 200, second 200, and last 175 participants. These analyses provided information that supports the correlated CFA model as having the best fit to the data. Further analyses including introducing new factor results from the EFA, used on the entire sample also support this conclusion. Although the correlated model has the best fit to the data, the model does not have good fit according to fit indicators and goodness of fit indices. The chi $\chi^2$ squared values are too high; RMSEA was the only indicator that was within acceptable limit within the .10 level. The $p$-value was significant as well. The majority of the factor loadings were above |.40|.

Post-hoc analyses using the discriminant-validity test provided justification to remove some of the loadings due to some items measuring the same information. Exploratory data analysis on the entire survey provided further justification for the possibility of reconfiguring the ED diagnoses into an EDS, or other dimensional model. These analyses included the use of the survey items regarding current and original ED diagnosis to illustrate ED diagnostic movement between EDs. Next, the AN diagnostic criteria item, fear of “fatness,” was compared across EDs to illustrate the inaccuracy of some diagnostic items that are separated by ED diagnosis, but have overlap in other EDs. Fear of “fatness” ratings were highest in respondents with a diagnosis of BN, although it is not a diagnostic indicator of this disorder. The ratings in the other EDs were also highest in the ratings (Likert ratings of 4 and 5) for this item.
Next, respondents who reported a history or no history of sexual violence were compared across EDs. Exploratory analysis of this risk-factor item illustrated higher reports of a history of sexual violence in EDs with multiple behaviors (e.g., binge and purge behaviors). This information might be useful in the identification of risk factors more specific to particular behaviors or EDs. To further identify differences among EDs, the existence of comorbidity among other psychological disorders was compared across EDs. Reports of comorbidity among respondents was high across all EDs. Further analyses of the specific comorbid disorders might provide more useful separation between EDs.

Next, an analysis of the survey item related to reported shame about the behaviors used within a respondent’s reported ED was completed. This analysis provided useful information about an important difference between ANr and all other EDs, with participants in the ANr diagnostic group reporting more low ratings of shame and less high ratings of shame compared to the Non-ANr group that encompassed all other EDs. This finding might provide useful information about shame in relation to the addition of behaviors outside of restricting alone.

To further illustrate the overlap that was seen in the ED factors within the CFA as well as high ratings in all ED diagnostic groups for the survey item fear of “fatness,” high comorbidity among all EDs, and movement between ED diagnoses as seen by the survey item related to current and original ED diagnosis, ED behaviors outside of respondents reported ED diagnosis was examined. These outside behaviors emphasize a limitation of the current DSM-5 diagnostic categories in that information is lost about that behavioral overlap.
Lastly, a cluster analysis was done on restricting and bingeing behaviors that provides more evidence to suggest errors in the conceptualization of EDs as separate and distinct disorders. Respondents with current ED diagnoses of ANr were compared to respondents with current ED diagnoses of BED using mean responses to bingeing and restricting items. It would be expected that individuals with a diagnosis of BED would not have behavioral overlap with those with ANr; however, overlap was seen with these two very different behaviors.

Another cluster analysis comparing mean response ratings on restricting, binge, purge, and binge/purge behavior items comparing those with a current ED diagnosis of ANr to those respondents with a current ED diagnosis of BN/ANbp. Similar to the prior cluster analysis, behavioral overlap was seen.
Chapter 5

Discussion

This chapter will first discuss the hypotheses from this study. Then, limitations of the study will be discussed. These limitations relate both to the survey itself as well as the population sample. Limitations of this study lend well to some of the areas that should be further explored and/or considered for future research. A discussion of future directions such as a dimensional model including the possible EDS is further explained. A dimensional model would include behavioral dimensions, cognitive dimensions, feelings and emotional dimensions, and comorbidity and related dimensions as well. These dimensions are explored in their relationship to the current diagnostic system and through some of the findings from the current study.

Next, broadband categories of diagnosis are discussed as possible areas to consider when grouping individuals with EDs, especially given the high percentage of individuals with comorbid psychological disorders. After a discussion of these broadband categories and the possible grouping that might be more useful for treatment, a discussion of what these future directions could indicate for diagnostic labels and treatment for EDs are considered. Lastly, all areas are summarized to further emphasize the findings and limitations of the current study as well as the possible areas for future direction in research and practice.

In Chapter 1, four hypotheses were identified for the current study. The first hypothesis was that “EDs are separate and distinct disorders as the current
classification indicates, *versus* there is significant overlap among EDs that might indicate EDs are continuous variables rather than categorical variables as they are currently conceptualized.” The study used a CFA to explore EDs as separate factors vs. EDs having indicated overlap and relationship. The correlated CFA model had the best fit to the data where there was allowed covariance between the ED factors. Exploratory data analysis also provided further evidence that there is overlap in relationship to behaviors. Overlap also occurs in the use of specific diagnostic indicators such as fear of “fatness” that is used in AN but was seen to be equally rated among all EDs. Poor fit and specification for the CFA and EFA suggest a factor model using the *DSM-5* indicators suggest that the overlap would be better represented with complex loadings or a non-factor model all together.

The next hypothesis was “The area of non-overlap among EDs is not related to behaviors *versus* the hypothesized area of non-overlap among EDs relates most specifically to behaviors (i.e., purge/no-purge, binge/no-binge, restricting/no restricting).” It appears that this hypothesis is a bit more complicated than originally perceived. Although there is less overlap between the most different of the behaviors (i.e., restricting and bingeing), it appears that there is still overlap of behavioral ratings by those that engage in mostly bingeing behaviors on ratings of restriction, as well as bingeing ratings for those that do not have as severe ratings on restricting-only behaviors. In Chapter 4, exploratory data analysis using clustering identified that ED diagnostic criteria items that related to behavior provide more accurate separation than the inclusion of both the
current cognitive and behavioral diagnostic items. It also appears that there is significant overlap related to the non-behavioral items as well.

The third hypothesis is that “Shame is not indicated as a variable related to specific ED versus shame is in indicator related to specific ED.” Through exploratory data analysis shame was explored across ED diagnosis. When individuals were grouped by specific ED, there was not a lot of difference between EDs. When ANr was separated from ANbp and all EDs besides ANr were grouped together, however, it became apparent that the addition of bingeing and purging related to shame. The ANr group when compared to all other EDs had lower counts of individuals indicating high shame and higher counts of individuals reporting low shame as compared to all other EDs that reported high levels of shame in relation to the behaviors within the ED diagnosis.

The final hypothesis, “Self-identified race/ethnic-identity is not indicated as a variable related to specific diagnosis versus self-identified race/ethnic-identity is a mediator/moderator of specific ED diagnosis”, was unable to be further explored due to the population sample not reaching those more marginalized groups for comparison. The inability to reach this particular sample is a limitation of the current study.

Limitations

As previously stated, a major limitation of this study was the sample of individuals with ED diagnoses. This sample was largely individuals who identify as female, because women tend to be the largest group of treatment-seeking individuals for EDs. There is also a higher prevalence of Caucasian individuals
who were in the study due to this population’s representation among those diagnosed and treated for EDs. It is also hypothesized that the social media accounts that re-posted the link have a higher following among Caucasian individuals with EDs. It was hoped that the use of a shareable link would allow professionals to provide access to the survey in groups that might not be represented solely in alumni treatment groups, or treatment centers. There are additional limitations in the generalizations of the findings due the inability to access both more marginalized ED populations with EDs (i.e., minority groups, men, and/or non-binary gender groups). Some other limitations included that this study was survey research rather than experimental, and the survey was given to a clinical-only sample.

One identified limitation due to the use of the clinical-only sample was the inability to assess the general populations ratings on the same items compared to the individuals with ED diagnoses. The addition of a non-clinical sample might provide information about typical response types versus atypical response types to specific ED diagnostic items. Although researchers have stated support for clinical samples for the examination of pathology, a clinical-only sample might still have non-normal data and the results may not provide a multivariate normal distribution (Hoyle, 2000). This concern was illustrated in the comparison of responses to specific ED diagnostic items by individuals with diagnoses outside of that specific ED item. Some items were skewed by the high population of individuals with ANr and ANbp diagnoses. CFA is relatively robust to non-normality, but with the combination of the requirement of a large sample size and
normally distributed data, it is often the case that the assumptions are not all met (Brown, 2014; Brown & Moore, 2013; Hoyle, 2000). Due to the large sample size there were abnormalities with the $\chi^2$.

**Future Directions**

Research comparing the model in different samples would increase the ability to generalize the possibly identified model’s validity and fitness across groups (Hoyle, 2000). Other analyses would then be used to compare the best-fit model to other possible non-nested models. These analyses might include latent-variable modeling (LVM) and multiple-sample analysis. LVM might allow for the factor OSFED to become a mediator of final diagnosis. LVM might also identify variables that are predictors of disordered eating that later becomes clinically significant or diagnosable as an ED.

Research suggests racial identity and/or gender identity are possible variables that relate to diagnosis. For example, African American women with high ratings of racial identity have been shown to have a protective factor against a diagnosis of ANr/ANbp, but that identity has not been shown to be protective against BN or BED (Harris, 2015). Higher-order models might also be examined to determine how the factors themselves are structured (Hoyle, 2000). Possibly with EDs there are second-order factors that can better operationalize the factors. Racial identity, gender identity, shame, and the endorsement of risk factors might be related to ED diagnosis.

A future analysis using path analysis might be used to determine if these variables are mediators/moderators of ED diagnosis. Analysis on the second part
of the survey also might illustrate if the items that are not used in diagnosis are equally predictive of diagnosis or if these items group in the same fashion as the diagnostic items. For example, are there risk factors that are more predictive of a possible dimension or grouping of ED? As previously mentioned, it is important to remember that it is possible that these social constructs do not measure what they are intended to measure. In the case of incorrect social-construct measurement, an investigator could commit a “nomological fallacy” because naming something is essential to explaining it (Harlow, 2014; Sparzo, Bruning, Vargas, & Gilman, 2008). Sparzo et al. (2008) explain mistakes that were made in measuring constructs in the past.

It is also important to realize, that sometimes our aim as researchers is to use these constructs to identify patterns, relationships, and/or themes in the environment (Harlow, 2010). Future research might include an exploratory factor analysis (EFA) and/or cluster analysis might be used to identify if the ED factors chosen were the most parsimonious and representative of the natural grouping of these items. Hoyle (2000) indicated the use of EFA post CFA as a possible method to determine whether a model has been specified correctly in relation to factors chosen. This technique might be of particular interest for this study due the purpose of the CFA in identifying an ED diagnosis structure that is the best representation of the true nature of these disorders.

Although the CFA did show that the correlated CFA model fit best, the follow-up EFA with CFA provided results with a better and more parsimonious fit. Although there was improved fit, the fit was still poor. This method
illustrates the importance in accuracy in model specification (Hoyle, 2000). In the future, a statistical taxometric (i.e., dimensional) approach to compare to the nosological (i.e., categorical) diagnostic paradigm might also support the possibility of a combined model. Taxometric analyses have been used in the past in ED research to identify and compare dimensional aspects of EDs to areas that are considered to be categorical (Williamson, Gleaves, & Stewart, 2005). An EDS might be a possible alternative model for ED diagnosis to allow for varying levels of engagement in specific behaviors as well as endorsement of clinical features, associated features, and comorbidity associated in the past with the separate ED categories.

This study was also limited in the use of a survey that was not validated as a psychometrically sound instrument. Although the items were specifically used from the DSM-5 diagnostic criteria for EDs, and were compared to diagnosis, it is possible that there were differences in the professional providing diagnosis and DSM edition used for diagnosis. In the event an individual provided a diagnosis as Other, because it was a diagnosis from DSM-IV-TR, that is now included in a different category, the individual’s diagnosis was re-coded as the current DSM-5 diagnosis (e.g., indicated other diagnosis of EDNOS-atypical anorexia was re-coded as OSFED). Future studies might examine archival data to show whether these structures are seen using data obtained before the adoption of DSM-5 for ED diagnosis. The use of archival data and prior DSM versions could provide more evidence that the results generalize and replicate across samples.
Future studies might also evaluate the overlap that has also been indicated between bingeing behaviors and obesity. These future studies might examine the relationship obesity has to other EDs without bingeing or with limited bingeing behaviors to determine how much commonality exists (Stice, 2008). These studies might further emphasize the difference between pathology and normality and/or the study might indicate a group that is at risk for the movement to clinically significant levels of ED behaviors. Future studies should also attempt to examine what dimensions would be best indicators of ED diagnosis.

**Dimensional Model**

Dimensional models of diagnosis have been suggested for future editions of the *DSM*. EDs represent a group of disorders that perhaps might be better conceptualized in a dimensional way. As mentioned earlier, evidence that supports this possibility relate to issues of differential diagnosis, comorbidity, shared risk factors, overlap of symptoms, movement between disorders, as well as lack of treatment specificity based on diagnosis. As previously stated, these common ED diagnostic issues might justify an EDS. Research on taxonomy might provide further evidence of how clustering of individuals occurs, allowing for more accurate labeling of dimensions, hierarchies, or syndromes that could lead to better interventions, prevention, and prognosis for those with EDs. As previously stated, the *DSM-5* is used to diagnose EDs and these disorders are separated based on the presentation of specific clinical features, associated features, and specific frequencies of these indicated features (APA, 2013).

The inclusion of two broad and heterogeneous categories of ED diagnosis
might provide some evidence for the need for a re-conceptualization of EDs (i.e., OSFED and UFED). The allowance for ratings on various dimensions could provide a clinician with more specific information for treatment as well as for risk assessment. Risk factors also could be used in determining how latent factors of EDs arise. ARFID, ANr, ANbp, BN, BED, and OSFED comprise behaviors that include restriction, bingeing, and purging. These disorders also comprise cognitive dimensions that include body distortion and devaluation of the self. The feelings and emotions that have been included in the clinical features include fear of fat/weight gain, shame about behaviors used, and shame about the body (i.e., size/shape). Comorbidity and risk factors are also implicated as important aspects that might differentiate disorders.

These risk factors are not all inclusive; however, they were the most cited in a review of the literature. The use of these risk factors might provide assistance in the identification of dimensions for a more flexible and broader diagnostic schema that might be more comprehensive and fluid. This diagnostic change might provide more individuals the ability to gain access to and receive treatment. Dimensions related to behaviors, cognitions, and feelings/emotions might begin with the clinical features to differentiate among disorders, and move to severity indicators, comorbidity, and risk factors. There may be a hierarchy, clustering, or grouping that is broken down by specifying among these dimensions. It is possible that various models of statistical analyses could lend to the identification of latent factors or hierarchical models of how these dimensions are related, as well as how these dimensions distinguish between these groups of EDs. These dimensions may
exist on a hierarchical structure in that specific dimensions might be more important for a diagnosis as compared to an individual who is at mild, moderate, or severe risk for an ED. It would seem that the behavioral dimension would be the most important dimension due to the fact that without the existence of ED behaviors, there would not be an ED.

Possible Dimensions

Behavioral Dimensions

The behavioral dimensions might center on the three behaviors that define EDs: Restricting, bingeing, and purging. It should be noted that the behavioral dimension is the most important indicator of whether or not an ED is present. In the absence of behavior, there cannot be an ED diagnosis. An individual who presents with the dimensions mentioned later, however, might be identified as high risk for the development of an ED. Eating intake could be one dimension where extremely low intake (high restriction) is one end of the axis and excessive intake (bingeing) is another end of the axis. There could be argument for keeping these two behaviors as separate. An individual might have high restricting and bingeing.

Perhaps, each behavior is a specifier itself and an individual might be rated on each of these behaviors. High restriction to normal eating could be a dimension, no bingeing to high frequency bingeing on the other end. An example of a current diagnosis that would align well to the use of dimensions is PD. Due to the lack of restriction and bingeing, this ED is grouped within OSFED instead of as a subgroup of AN or BN. The ability to use a behavioral dimension as one aspect might provide information about how those with PD differentiate. For example,
there may be individuals with a PD diagnosis who vary in the other dimensions and therefore would be provided treatment accordingly.

The use of compensatory behaviors might also be conceptualized in this way. One end of the compensatory dimension might be no compensatory behaviors and the other end would be the use of multiple purging methods. This particular dimension could also be included as a severity indicator due to the awareness that multiple purging methods have been shown to relate to higher severity and poor prognosis (Edler, Haedt, & Keel, 2007). Factor analyses have shown varying dimensional models of behaviors. Many models have indicated a three-factor model that includes one or two behavioral dimensions. These behavioral dimensions have included binge eating and purging behaviors (Touyz, 1994; Walsh & Garner, 1997; Williamson, Womble, Smeets, Netemeyer, Thaw, Kutlesic, & Gleaves, 2002).

Restriction has been identified as a possible variation from normality; however, there might be issues in the use of a normative sample compared to a clinical sample (Achenbach, 2005). There also is a possibility that restriction as compared to dieting is hard to identify without the use of BMI and weight indicators. Figure 5.1 illustrates how an exploratory factor analysis (EFA) or further cluster analysis might examine the behavioral dimension with more behaviors than seen in Figure 4.7 and Figure 4.8. These analyses might classify caloric input and output as continuous variables. The overlap and distinction might indicate how this dimensional grouping relates to specific behaviors used. There is potential that the origin of normal eating serves as the little- to no-risk place holder.
so that as individuals move away from the origin the severity increases. These same analyses might also be used for the other dimensions. Figure 4.7 in Chapter 4 might also be a starting point for further exploration into the behavioral clustering and separation based on where boundary lines are indicated.

**Figure 5.1.** False data set to provide a visual representation of how a behavioral dimension of restriction, bingeing, and purging might appear if all behaviors are analyzed at once. These data points can be used to identify possible groupings of behaviors.

**Cognitive Dimensions**

The cognitive dimensions could include body-image distortion, focus on shape/weight, and possibly positive and negative beliefs about control over body size. Similar to the previous dimensions, body-image distortion could be a continuum where there is no/limited distortion where an individual might have an awareness of weight and size, all the way to the other end of the axis of an extreme lack of insight into weight/shape/size. For this body distortion dimension or specifier, individuals might believe they are much smaller or larger than is accurate. This dimension might be important for clustering of characteristics that might be considered separate within the current diagnostic paradigm (e.g. ANr
with severe distortion and BED with severe distortion compared to these same diagnoses without distortion).

Individuals with these characteristics might rate similarly on this dimension indicating the possibility that a treatment focus for this group might be body image and cognitive distortions. Focus on shape and/or weight and the relationship that focus has with how a person perceives one’s worth might be harder to assess but might be necessary as a dimension. This dimension might include ratings where there is no focus on shape and/or weight with one’s self-worth related to other aspects of life, to high focus on shape and/or weight with self-worth completely tied to this perception. The belief that the methods used will attain the “ideal” body whether it be thin, curvy, or muscular might be important. This aspect of the cognitive dimension might relate to control and the belief that particular behaviors will assist in the attainment of the “ideal.” There might be variation in the “ideal,” however, in that it might be a thin, curvy, or muscular conceptualization due to variations in gender and cultural ideals and standards of beauty. The ideal that the individual aspires to obtain might also relate to how one’s ED profile or taxonomy is interpreted.

A woman with an ED diagnosis who has the ideal of losing feminine features might be better grouped with those who have experienced similar trauma (e.g., objectification, sexual harassment, sexual violence, or childhood sexual abuse). In this example, this presentation might be significantly different than an individual who has experienced weight-related teasing and has a goal of becoming thinner to meet culturally based standards of beauty. These differences in
cognitions might end up becoming dimensional aspects that guide what type of treatment is implicated. A cognitive dimension could be goal-oriented weight and/or shape modification to meet “ideal” body type; where someone might have low/no goals to meet the ideal (i.e., the ED behaviors do not relate to obtaining the “ideal body”), to high levels of “body ideal” attainment using these ED behaviors. Positive and negative beliefs about the control one has over eating have been shown to relate to specific ED behaviors used (Burton et al., 2017). Currently, however, whether control fits into the cognitive dimension or feeling and emotional dimension is unclear. 

*Feelings and Emotional Dimensions*

The feeling and emotional dimensions might include feelings of control or lack of control over eating and/or food, body satisfaction, shame related to body size, shame related to behaviors used, and stigma/self-worth in relation to size. The dimension related to control could include feeling of lack of control over eating/food on one end to high feelings of control over eating and food at the other end. The feeling that the behaviors used assist in controlling body shape and size and the perception that one has control or does not have control might be important in relation to where the individual falls on the behavioral and cognitive dimensions. Body satisfaction has been implicated for all EDs but might be important as an indicator of risk related to severity of dissatisfaction. For example, many women report dissatisfaction with their bodies to some degree. There is likely a cut-off point where body dissatisfaction is clinically significant.

Body dissatisfaction might be related to an individual’s shame related to
body size. This shame related to size and body dissatisfaction would likely relate to the cognitive dimension of body-image distortion. An individual might, in fact, have shame and body dissatisfaction, but perhaps one’s distortion is not as high. There might be an additive effect of these indicators or dimensions (i.e., high ratings on several dimensions might indicate a severe ED). Shame related to behaviors might be a dimension that could assist in the reduction of underreporting of behaviors.

This shame about ED behaviors could indicate that certain behaviors are more stigmatized and therefore might be good motivators for change. This knowledge might assist in treatment specification as well as identifying a diagnostic ED profile. Stigma and self-worth in relation to body size might also relate to specific clustering of characteristics of individuals who possibly have struggled with their weight during childhood/adolescence or are included in a more marginalized subset of those diagnosed with ED. The awareness that an individual belongs within this group might assist a clinician in the recommendation of groups that might be more inclusive and not further marginalize this population.

Comorbidity and Related Dimensions

As mentioned previously, clinicians often report that individuals diagnosed with EDs have comorbid depression, anxiety, post-traumatic stress disorder (PTSD), and personality disorders. These comorbid disorders might be symptoms of malnourishment and/or consequences due to the impairment in social, emotional, relational, and/or career functioning. According to researchers and the DSM-5, EDs are associated with significant functional impairment and
numerous psychological problems that include elevated rates of mood disorders, anxiety disorders, substance use, and impulse-control disorders (APA, 2013; Baker, Mitchell, Neale, & Kendler, 2010). Comorbidity has been indicated as a predictor of poorer treatment outcome related to increased severity of symptomology of ED behaviors (Keel, Brown, Holm-Denoma, & Bodell, 2011).

In a study comparing a control group to those at high risk for ED development and those already diagnosed with EDs, comorbidity increased as risk increased (Aspen, Weisman, Vannucci, Nafiz, Gredysa, Kass, & Taylor, 2014). There may be, however, an importance in the identification of which disorder presented first. For example, if depression or anxiety were the precursor to the development of the ED, this knowledge might be important for treatment. Perhaps, comorbidity is a dimension where one axis has no comorbid disorders and then the other end is the endorsement of several comorbid disorders. Otherwise, the presence or absence of comorbid internalizing or comorbid externalizing narrowband syndromes might be a better place to start.

**Broadband Categories of Diagnosis**

The use of the current broadband categories of internalizing and externalizing syndromes might serve as a template for a hierarchical dimensional model. These broadband categories might lead to a clustering of those individuals with EDs with comorbid disorders within these categories. The awareness that these categories typically relate to different treatment might allow for more specified treatment recommendations. These groupings have been useful in the examination of comorbidity and developmental course of these disorders.
(Achenbach, 2005). Both externalizing and internalizing disorders are conceptualized in terms of the way the characteristics associated with them are expressed, the nature of the behaviors exhibited, and the target(s) to which the behaviors are directed (Achenbach, 1966).

Externalizing disorders are considered as more behavioral disorders in which these behaviors are directed toward others or the environment in an aggressive and/or disruptive way (e.g., fighting, lying, destroying property). For example, narrowband externalizing syndromes often seen as comorbid with EDs are substance-use disorders. It is believed that there is an interaction between internalizing and externalizing factors that are heritable and that might be related to gender differences (Hudson, Zanarini, Mitchell, Choi-Kain, & Gunderson; Kramer, Krueger, & Hicks, 2007). Internalizing syndromes are a large group of disorders that include problem behaviors that are typically directed at the self rather than others (i.e., these behaviors are directed inward thus internalized). There are similarities and differences in risk and protective factors, pathways, and outcomes for both internalizing and externalizing syndromes. It is important to note that individuals frequently have high comorbidity with other narrowband internalizing syndromes, meaning there is a lot of overlap and there is a high likelihood that an individual might meet criteria for more than one of these disorders.

Individuals with internalizing syndromes might have behavioral, affective, and cognitive impairments. Narrowband categories for internalizing syndromes include anxiety disorders, depression, phobias, and other mood
disorders. The prevalence rates for internalizing syndromes are not seen as completely accurate due to differences among cultures and norms in different societies. It is important to note that broadband classifications do encompass both internalizing and externalizing syndromes, but research has demonstrated that there is not a high correlation between these two broadband categories (Achenbach, 2005). Thus, it is possible for an individual to be diagnosed with both an internalizing and externalizing syndrome. It may be that EDs cluster in a way that demonstrates the comorbidity of internalizing syndromes, externalizing syndromes, and a combination of both internalizing and externalizing syndromes. These groups might indicate a more specified type of intervention that has evidence for better prognosis for both EDs as well as comorbid disorders.

**Diagnostic Labels & Treatment**

Diagnostic labels would likely reflect profiles or hierarchical dimensions. The diagnosis might be ED, Eating Disorder Spectrum, or Continuum of EDs. Within this broad category there might be ratings on dimensions or specifiers as to whether there is presence or absence of these dimensions, that relate to more narrowband categories, disorders, or specific features that might guide treatment. There might be a separation based on the specified comorbid disorders and their placement within the broadband categories of internalizing and externalizing syndromes. It is possible that there are more disorders than previously indicated in the *DSM*. Researchers identified that a three-factor model had the best fit in studies investigating dimensional structures, but they also found that models with eight factors and six defined factors at times had reasonable fit, illustrating that there
may be more specified diagnoses than the current four specific with two non-specific categories (Touyz, 1994; Walsh & Garner, 1997; Williamson, Womble, Smeets, Netemeyer, Thaw, Kutlesic, & Gleaves, 2002).

The use of the dimensions of behavior, cognition, feelings and emotions, and comorbidity could identify more homogenous groups of disorders that may provide information that allows for more targeted treatment. For example, there might be individuals with internalizing disorders who engage in one of the ED behaviors, two ED behaviors, or all three ED behaviors. Individuals might then be differentiated based on whether they have indicated body-image distortions, severity of body dissatisfaction, and the “ideal” that the individual aspires to obtain. There may then be individuals with these indicators who have both internalizing and externalizing syndromes, as well as those with externalizing alone. Cluster analyses might illustrate that there are fewer groups than this example, but it is possible that specifiers would be useful in indicating the biggest area of concern. Trauma treatment for some individuals diagnosed with EDs might be the most pressing area, whereas for others it might be the cognitive domain.

Diagnostic labels would likely come out of how these dimensions arise. As previously explained, this researcher would hypothesize that an integration of the three dimensions might provide a model that is similar to ASD in that there are specifiers that have arisen from the clinical features. As previously explained, ASD was an addition to the DSM-5 in the creation of a spectrum from several disorders that were previously conceptualized as separate and distinct. Within ASD, the disorders shared many comorbid disorders, were difficult to differentiate among
for diagnosis, and appeared to be heterogeneous within diagnostic categories. EDs share many of those issues and as seen within the CFA analyses with covariance between ED factors, and the movement from original to current diagnosis, there might be reason to conceptualize EDs in a similar way. The main purpose of re-conceptualization would be to guide treatment and prevention for better prognosis, earlier detection of those at risk, and the goal of decreasing prevalence rates.

Risk factors might be included as dimensions due to their relationship to clinical features of most current EDs. These factors could be used in early identification of EDs, early assessment, and treatment to determine possible needs related to treatment and the severity of risk. It is possible than an individual may have a high rating on one dimension that alone would not be enough for diagnosis. For example, an individual may have high levels of the cognitive dimension of body distortion. If this distortion does not occur in the presence of behaviors, then the person would not have a diagnosis of an ED. There may be a way to use these specifiers and lack of specifiers on dimensions as rule-outs for EDs.

In the previous example, body dysmorphic disorder or BDD might be something to consider instead (i.e., presence of severe body-image distortion without ED behaviors). Risk factors might then be used for assessing the risk for ED development when an initial assessment is made, to assess severity, or risk related to prognosis for an individual who possibly has varying endorsement of risk factors. These factors might also be used in primary prevention efforts for universal prevention of EDs. Primary prevention in schools could include the use of surveys to identify those at no, mild, moderate, and severe risk for the
development of EDs to assist in a location where protection against risk factors and the ability to provide coping skills could aid in decreasing the use of ED behaviors or ED cognitions and/or feelings and emotions that are related to EDs and other internalizing syndromes.

Protective factors would be an area to explore for treatment purposes to alleviate some of the risk that is posed through the endorsement of these factors. Protective factors have been shown in the literature to improve prognosis and possibly could reduce prevalence and incidence rates of EDs. As previously mentioned, comorbidity might be another important aspect of a dimensional model for EDs. The comorbid disorders might be an essential aspect to what pathology is most related to functional impairment and which disorder might guide treatment suggestions. Medication is often used according to comorbid disorders, however, there also could be a difference in an individual who presents with depression and anxiety disorders as a result of an ED compared to an individual who has depression or anxiety disorders leading to the presentation of an ED.

Weight might also be an important aspect of the ED dimensions without this factor’s inclusion in actual diagnosis. Knowledge about weight and behaviors are important for medication selection, exercise restriction levels, and nutritional planning. The exclusion of weight as a diagnostic dimension relates to the similarities of ANbp and BN, and their separation in part related to weight. Treatment is not specified for these disorders, so the distinction seems less appropriate. The use of weight as a diagnostic feature might also lead to further stigmatization of those who have EDs that are also considered overweight or
obese. These individuals might be less likely to access services due to shame and stigma. The high prevalence of those diagnosed in the broad OSFED category also might indicate the need for the frequency and duration to not be related to diagnosis but could be included as severity indicators. Severity indicators might provide information about specific treatment modalities required. For example, an individual with high severity ratings would likely be guided to inpatient treatment vs. someone with low severity ratings who might first be sent to outpatient level care.

These recommendations might also assist insurance companies in decisions related to payment for ED services. It is possible that an individual might need to endorse a factor or specifier on all dimensions and have an indicated severity of a specific amount to differentiate between ED and at risk for an ED. For example, if an individual does not have the behavioral dimension but has both cognitive and feeling/emotional dimensions they may be at a higher risk than an individual who endorses feeling/emotional dimensions alone. As previously stated, the behavioral dimension would be at the top of the hierarchical model as the absence of ED behaviors would be exclusionary for an ED diagnosis. There might be groupings that appear to mimic some of the current diagnoses and in that event, it might be possible that the diagnostic labels stay the same, but in the United States, there is a lot of emphasis and value on thinness, the label on a disorder that is known to be specified only for underweight individuals might further emphasize one disorder as superior to another (i.e. stigmatizing or marginalizing those who are overweight or normal weight with EDs).
Conclusions

Williamson et al. (2002) explained the possibility that taxometric study might be necessary to conceptualize EDs in a more meaningful way. These researchers found a three-dimensional model of EDs with binge eating, fear of fatness/compensatory behaviors, and drive for thinness. These dimensions were important separators of ratings on the diagnostic interview for EDs from the DSM-IV (Williamson et al., 2002). Other researchers have also demonstrated better fitness among dimensional models of EDs compared to categorical models (Luo, Donnellan, Burt, & Klump, 2016). These researchers found that EDs had three dimensions that included body dissatisfaction, binge eating, and weight/preoccupation/compensatory behaviors (Luo et al., 2016).

Lou et al. (2016) also explained the use of normative samples may have led some previous studies to have more skewed results that illustrated conflated support for categorical ED diagnoses. Support for dimensional models of ED diagnosis continues to be a topic of debate among ED researchers. The varying dimensions cited in the literature show the unsettled questions surrounding the number and types of dimensions that exist for EDs. This researcher believes that a model that encompasses the cognitive, behavioral, and emotional/feeling dimensions might provide a better structure for specifications of the areas that a particular individual with an ED diagnosis might need to target treatment. These dimensions would allow for risk factors related to the specific dimensions guide prevention efforts as well. Comorbidity as a dimension also has empirical support in that researchers have found that comorbidity is more common than single-
diagnosis cases of most psychopathology including EDs (Newman, Moffitt, Caspi, & Silva, 1998).

Awareness of what type of comorbid disorder in terms of broadband categories (i.e., internalizing, externalizing, both, or no comorbid disorder) could identify specific dimensions that differentiate among disorders. It is possible that the labels could refer to the dimensions or EDS or Continuum of EDs might serve as a more appropriate diagnostic schema. Future research would be necessary to identify these dimensions through taxometric methods with large clinical samples of those with ED diagnoses. Treatment for EDs is limited currently in that most treatment is not differentiated by disorder except for nutritional support and exercise recommendations. It would be imperative for treatment effectiveness to provide more information that might allow for treatment specificity, homogeneity within groups, and heterogeneity among groups of EDs. Research should also work to identify if dimensional-only models, or hybrid models might provide a better fit to the true nature of eating pathology (Luo et al., 2016).

EDs are complex diagnoses that encompass a large range of behaviors, cognitions, feelings/emotions, risk factors, and comorbid disorders. There is great heterogeneity among these disorders that is not explained using the current diagnostic system (i.e., DSM-5). An analysis of the structure of ED diagnosis might provide a system for ED classification with more clinical utility for both treatment and prevention efforts. For example, there might be evidence for a separation between individuals who have restricting behaviors with body image distortions vs. individuals who have restricting behaviors without body image
distortions. This distinction would directly relate to what types of treatment might be necessary (e.g., cognitive behavioral therapy, body-image groups, etc.).

Prevention efforts might also be more informed if specific risk factors could be directly linked in a more meaningful way. For example, child sexual abuse might be found to be linked to a specific component of EDs that is more likely to be seen across the more severe ED dimensions. Currently, the risk factors are general in terms of relation to ED diagnosis. Other factors such as shame in relation to specific behaviors could be used to help differentiate some type of grouping given that ANr and all other EDs grouped differently according to shame. Comorbidity is high among EDs, this knowledge might also guide the way that future diagnostic schemata are formed. There might be differences among those diagnosed with comorbid internalizing syndromes versus those diagnosed with comorbid externalizing syndromes or those diagnosed with both broadband categories of diagnosis.

The creation of a diagnostic model that fits well across groups that have largely been ignored in ED research might also provide evidence for the need for the re-conceptualization of other psychiatric disorders. Studies have shown that diagnostic criteria are not consistent across less represented groups (e.g., African American females, males, etc.) (Harris, 2015; Mehler & Andersen, 2017). Unfortunately, this dataset did not provide a diverse sample to assess differences across demographic groups.

Currently, it is well known that the nosological classification has flaws, but without studies that compare models and examine these disorders in an
inductive way, little change will happen in future editions of the DSM manuals. The availability of a diagnostic system that provides more appropriate groupings of EDs could allow efforts to be more specified for universal primary prevention efforts, treatment specificity, and better access to treatment. This information could also allow for research efforts aimed at evidence-based treatments that are more tailored to the specifiers of dimensions within the ED diagnostic groups.

It is quite possible that diagnostic labels might be beneficial for particular psychiatric disorders, but they may be outmoded for other disorders. Taxon might provide enough information about a profile to allow a treatment provider to select treatments and have knowledge about medication use and prognosis. Prevention of EDs and effective treatment of EDs is dependent on research that explores etiology and connections among the many different factors at play in the development of an ED in an individual. EDS is just one possible dimensional approach that might be a better model for diagnosis; however, other models should continue to be tested if they are more parsimonious and more representative of ED structure.

Although the CFA models compared did not provide evidence of good fit to the data, the correlated CFA model that allowed for freely estimated covariance among the ED factors had better fit than the perfectly correlated or uncorrelated CFA models. This improved fit provides some evidence that EDs are not separate and distinct the way that the DSM-5 would suggest. The DSM-5 orthogonal model had poor fit to the data. As previously stated, all of the CFA and EFA models did not have great fit in part because the models were not
specified well. This specification was done specifically due to the need to model the structure per the *DSM-5* to compare to other proposed models. A better factor model would need more parameters and complex loadings to allow for the behavioral overlap between EDs. However, once the model starts becoming this complex needing to allow there to not be such distinction a dimensional model (e.g., an EDS) might better represent the true underlying structure of EDs.

This study also provided visual representation of movement among ED diagnoses by identifying original ED diagnosis as compared to current/most recent diagnosis. Movement among disorders is something that is seen in many of the psychiatric disorders that have issues within differential diagnosis. This movement would be less likely to occur among psychiatric disorders that are more clearly defined. A future study on ED diagnostic models that use what is known about other disorders with similar issues, as well as the various dimensions outlined earlier, might provide a good basis for a more clinically sound diagnostic category.
Appendix I

Anonymous Online Survey

Eating Disorder Diagnosis Survey

1 – Informed Consent
2- Electronic Consent

Demographics

3. Current age: ________

4. Race/ethnicity:
   Check all that apply:
   - American Indian or Alaska Native
   - Asian
   - Black or African American
   - Native Hawaiian or Other Pacific Islander
   - White
   - Other _____________________ please specify
   - Prefer not to answer
   - Specify:
   - Hispanic or Latino
   - Not Hispanic or Latino
   - Prefer not to answer

5. SES
   Self:
   Level of education completed check all that apply:
   - High School Diploma
   - GED
   - Trade school
   - Some college
   - Associates
   - Bachelor’s Degree
   - Bachelor’s & Certificate Program
   - Some graduate school
   - Master’s Degree
   - Doctoral Degree
   - Post-doctoral education

6. Mother/Father/Guardian 1:
   Level of education completed check all that apply:
   - High School Diploma
• GED
• Trade school
• Some college
• Associates
• Bachelor’s Degree
• Bachelor’s & Certificate Program
• Some graduate school
• Master’s Degree
• Doctoral Degree
• Post-doctoral education

7. **Mother/Father/Guardian 2**
   Level of education completed check all that apply:
   • Lived with single parent/guardian
   • High School Diploma
   • GED
   • Trade school
   • Some college
   • Associates
   • Bachelor’s Degree
   • Bachelor’s & Certificate Program
   • Some graduate school
   • Master’s Degree
   • Doctoral Degree
   • Post-doctoral education

8. **Geographic location**
   • Northeastern US
   • Mid-Atlantic US
   • Southern US
   • Midwestern US
   • Southwestern US
   • Western US
   • Non-US ________________________ please specify
   • Other US _______________ please specify

9. **Gender identity**
   • Male
   • Female
   • Non-binary/Gender-queer
   • Intersex
   • Third gender
   • Prefer not to answer
11. How old were you when you were first diagnosed with an ED: 
_______

12. At the time of first diagnosis, I engaged in the following behaviors, check all that apply:
- Restricting caloric intake
- Restricting caloric intake and binge episodes
- Restricting caloric intake and binge/purge episodes
- Restricting caloric intake and purge episodes
- Normal food intake and purge episodes
- Normal food intake and binge episodes
- Normal food intake and binge/purge episodes
- Binge/purge episodes
- Binge episodes
- Compensatory Behaviors (i.e. over-exercise or excessive movement).
- Purging Behaviors (e.g. self-induced vomiting, diuretic misuse/abuse, laxative misuse/abuse, or past ipecac misuse).

13. My eating disorder diagnosis was:
- Anorexia Nervosa-restricting type
- Anorexia Nervosa binge/purge type
- Bulimia Nervosa
- Binge Eating Disorder
- Other Specified Feed and Eating Disorder
- Unspecified Feeding and Eating Disorder
- Other _____________ please specify

14. My eating disorder diagnosis is/has been at one time or another:
- Anorexia Nervosa-restricting type
- Anorexia Nervosa binge/purge type
- Bulimia Nervosa
- Binge Eating Disorder
- Other Specified Feed and Eating Disorder
- Unspecified Feeding and Eating Disorder
- Other _____________ please specify

15. The medical/mental health professional who diagnosed me (list all that apply):
- Primary Doctor
- Psychiatrist
- Psychologist
- Other ________________
Eating Disorder Block 1:
**16-1** During my illness (past or present) I avoided/restricted food intake due to sensory characteristics (e.g. texture, aversive consequences of eating) as a child/adolescent.
Never Rarely Sometimes Often Always

**16-2** I was underweight as a child/adolescent OR lost a lot of weight as a child or adolescent as a result of avoiding/restricting food consumption
Never Rarely Sometimes Often Always

**16-3** I was overweight as a child/adolescent OR gained a lot of weight during childhood as a result of bingeing, available food was not as healthy, lack of exercise, etc
Never Rarely Sometimes Often Always

**16-4** I relied on enteral feeding or oral nutritional supplements for weight maintenance (e.g NG tube feeding, BOOST/ENSURE type supplement).
Never Rarely Sometimes Often Always

**16-5** My eating disorder behaviors interfered with my daily activities, including but not limited to: attending school, socializing with friends, participating in sports/hobbies etc.
Never Rarely Sometimes Often Always

**17** Food avoidance/restriction was due to cultural/spiritual practices?
Never Rarely Sometimes Often Always

**20** Food avoidance/restriction was due to lack of food/resources due to living in conditions of poverty (i.e. not enough food)
Never Rarely Sometimes Often Always

**21** Food avoidance/restriction was due to real food allergies/intolerance
Never Rarely Sometimes Often Always

Eating Disorder Block 2
**22-1** During my illness (past or present) I engaged in restricted eating behaviors (e.g. starvation, eating minimal calories to maintain low body weight, etc.)
Never Rarely Sometimes Often Always

**22-2** I have been told that my body weight is considered ‘overweight’ or ‘obese’ and is significantly higher than what is expected for my height, age, etc.
Never Rarely Sometimes Often Always

**22-3** I have been told that my body weight is considered ‘underweight’ and significantly lower than what is expected for my height, age, etc.
Never Rarely Sometimes Often Always

22-4 I have a fear of becoming fat
Never Rarely Sometimes Often Always

22-5 I have a fear of gaining weight
Never Rarely Sometimes Often Always

Eating Disorder Block 3
23-1 I have/use behaviors that interfere with gaining weight
Never Rarely Sometimes Often Always

23-2 I have/use behaviors that interfere with losing weight
Never Rarely Sometimes Often Always

23-3 I have a poor body image and/or place a large importance on weight/shape in my value as a person
Never Rarely Sometimes Often Always

23-4 I use disordered eating behaviors (e.g. starvation, binging, purging, exercise, etc., in an attempt to control my weight/shape
Never Rarely Sometimes Often Always

23-5 During my illness (Past or Present) I engaged in binge-purge episodes (e.g. binge episodes followed by: self-induced vomiting, misuse of laxatives, diuretics, medications, over-exercise, and misuse of enemas, etc.).
Never Rarely Sometimes Often Always

Eating Disorder Block 4
24-1 During my illness (past or present) binge-purge episodes occurred at least 2 times a week for 3 months duration?
Never Rarely Sometimes Often Always

24-2 My self-esteem and self-evaluation are greatly impacted by my impression of my weight, body image, shape, or appearance.
Never Rarely Sometimes Often Always

25 During my illness (past or present) I engaged in purging episodes (e.g. self-induced vomiting, misuse of laxatives, diuretics, or enemas) without the presence of binge episodes
Never Rarely Sometimes Often Always

26 Unless never, please specify:
Less than 1x week 1-3x a week 4-7x a week 8-13x a week 14+ x a week
During my illness (past or present) I engaged in binge episodes (i.e. eating more food than is typical in 2 hour period, eating past the point of fullness not in the context of a holiday/celebration, eating excess food in secret, or enough food that one might be embarrassed).
Never Rarely Sometimes Often Always

Unless never, please specify:
Less than 1x week  1-3 x a week  4-7x a week  8-13x a week  14+ x a week

During my illness past or present. I engaged in binge episodes during which I felt that I lacked self-control over eating behaviors (e.g. I could not stop eating or control how much I ate)
Never Rarely Sometimes Often Always

During binge-eating episodes I experienced-
Check all that apply-
• Eating much more rapidly than normal
• Eating until uncomfortably full
• Eating large amounts of food in the absence of hunger
• Eating alone because of embarrassment of how much I was eating
• Feeling disgusted with myself, depressed, and/or guilt over binge episode
• Eating only an excessive amount at nighttime (i.e.after the last meal of the day/throughout the evening when others were asleep).
• Did not engage in binge behaviors

During my illness (past or present) I engaged in multiple methods of purging?
Never Rarely Sometimes Often Always

If sometimes/often please specify:
Self-induced vomiting, Misuse diuretics, Misuse laxatives, Misuse of enemas, Use of IPECAC, Use of diet pills, Over-exercise, Other: ________________________(please specify)

During my illness (past or present) I engaged in behaviors that were truly specific to my eating disorder diagnosis (e.g. Diagnosed with Anorexia Nervosa Restricting Type without experiencing any episodes of binge/purge, purging behaviors alone, or binge behaviors alone).
Never Rarely Sometimes Often Always

During the illness (past or present) I engaged in behaviors that are typically seen in eating disorders OTHER than the one that I was diagnosed.
Never Rarely Sometimes Often Always

Over the course of illness I have had more than one type of eating disorder
(e.g. Diagnosed with Bulimia Nervosa and later diagnosed with Binge-Eating Disorder
Never Rarely Sometimes Often Always

33-4 I believe my eating disorder diagnosis is representative of my experience of the disorder
Never Rarely Sometimes Often Always

33-5 During my illness (past or present) I have received treatment that has been very specific to my diagnosis.
Never Rarely Sometimes Often Always

Eating Disorder Block 6
35-1 During my illness (past or present) I had a lot of shame about my specific eating disorder diagnosis
Never Rarely Sometimes Often Always

35-2 During my illness, treatment, and/or recovery I believe my specific diagnosis has made others respect me more
Never Rarely Sometimes Often Always

35-3 During my illness (past or present) other people have judged or criticized me about my eating disorder diagnosis.
Never Rarely Sometimes Often Always

35-4 During my illness (past or present) I had shame about the behaviors that I engaged in related to my eating disorder diagnosis (e.g. restriction, binge/purge cycles, binge episodes, etc.)
Never Rarely Sometimes Often Always

33-5 During treatment for my illness (past or present) I attended groups, sessions, and treatment with individuals diagnosed with eating disorders that were different than my diagnosis.
Never Rarely Sometimes Often Always

36 During treatment for my illness (past or present) I received treatment at which of the following levels of care, please check all that apply:
- Inpatient/Residential
- Intensive Outpatient (IOP)
- Outpatient care (e.g. individual counseling, psychiatric care, nutrition/dietary appointments etc.)
- Did not receive treatment for my eating disorder

37 During treatment for my illness (past or present) I received care from: Check all that apply:
- Psychologist/Therapist.
• Psychiatrist
• Dietician/Nutritionist
• Medical Doctor
• Other ___________(please specify), did not receive treatment

38 If I am in a period of recovery, recovered, or in a sustained period of wellness, please indicate what age it was that you reached this point.

_______ (age of sustained recovery/wellness)

RISK FACTOR ITEMS Block 1

39-1 I have a parent/guardian with a history of eating disorder diagnosis?
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

39-2 I have a parent/guardian with a history of mental illness?
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

40 I have a medical history of other co-occurring diagnoses? YES NO Prefer Not to answer
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

41 Check all that apply:
• Obsessive-Compulsive Disorder (OCD)
• Major Depressive Disorder
• Schizophrenia spectrum disorders
• Factitious disorder
• anxiety disorder
• Autism-Spectrum Disorder
• ADD/ADHD
• Intellectual developmental disorder
• Post-traumatic Stress Disorder (PTSD)
• Suicidal Ideation
• Social Phobia
• Body-dysmorphic Disorder
• Substance use disorder
• Bipolar disorder
• Personality disorder
• Other _______________________ please specify

RISK FACTOR Block 2

42-1 I have a history of self-injury, suicidal ideation, or past suicide attempt
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

42-2 I believe that thinness is valued in our culture
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

42-3 I want to look like the “ideal body type” in the United States/Western Culture?
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

42-4 The ideal body type for me relates more to my culture/race/ethnicity
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

42-5 During my lifetime I have experienced sexual violence (e.g. I was raped, sexually abused, coerced sexually, etc).
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

42-6 I have experienced teasing related to my weight
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

42-7 My parents/guardians have a history of obesity
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

RISK FACTOR Block 3

44-1 I place a lot of importance on my social media appearance
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

44-2 I use social media to follow people that I admire or aspire to be like
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

44-3 The individuals that I follow on social media represent western ideals of body and beauty standards
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

44-4 The individuals that I follow are part of the body positive movement or Eating Disorder Recovery movement.
Strongly Agree  Slightly Agree  Agree  Slightly Disagree  Strongly Disagree

44-5 I use social media (e.g. Facebook, Instagram, Snapchat, Tumblr, etc.) about:
0  1-3 hours a day  3-5 hours a day  5-8 hours a day  8+hours a day

45 I compare myself to the people I see on social media.
Never Rarely Sometimes Often Always

Total:
5 demographics
46 diagnostic
16 risk factors
67 Total items condensed into blocks in Qualtrics for 45 questions.
Appendix II

IRB Social Media Recruitment Statement

FACEBOOK, ED WEBSITE & INSTAGRAM POSTING

Are you interested in participating in a URI study on Eating Disorders (EDs)? Are you over 18 years old, and have you been diagnosed with an ED in the last 5 years? If you answered yes to those 3 questions, you may be interested in participating in a 30-minute survey about EDs. Researchers at the University of Rhode Island (URI) are interested in looking at ED diagnosis and the accuracy of how well the diagnosis represents the experience of those with EDs. The benefit of participation is contributing to research efforts to improve diagnosis, treatment, and prevention efforts for EDs.

This research has been approved by The University of Rhode Island Institutional Review Board

https://uribus.co1.qualtrics.com/results/?surveyId=SV_07D09E55IS1cHGZ#/surveys/SV_07D09E55IS1cHGZ

For any questions please feel free to email Juliana Steffes at juliana_steffes@uri.edu or the Principal Investigator W. Grant Willis at wgwillis@uri.edu
Appendix III

**IRB Low Risk Survey Consent Form for Research**

You are being asked to take part in a research study. The purpose of the research study is to investigate the experience of individuals diagnosed with Eating Disorders. The researchers are interested in behaviors, thoughts, feelings, and risk factors related to specific Eating Disorder diagnosis. These different areas of interest are being examined in relation to how well diagnosis fits the actual experience and behaviors used during the Eating Disorder. The study could lead to changes in diagnostic models as well as improvements in treatment specification as well as improvements in prevention efforts. Please read the following before agreeing to be in the study. If you agree to be in this study, it will take you approximately 30 minutes (i.e. about 2 questions per minute) to complete this survey. Questions will be asked about demographics (e.g. where you live, racial identity, gender identity etc.), behaviors used in your Eating Disorder, other diagnoses, treatments used, and questions about risk factors. There are no known risks, benefits or compensation.

Your responses will be strictly anonymous. The responses may be used in a research paper and dissertation but there will be no identifiable information that could be traced back to you.

The decision to participate in this study is entirely up to you. You may refuse to take part in the study at any time without affecting your relationship with the investigators of this study or the University of Rhode Island (URI). Your decision will not result in any loss of benefits to which you are otherwise entitled. You have the right not to answer any single question, as well as to withdraw completely from the survey at any point during the process; additionally, you have the right to request that the researchers not use any of your responses.

You have the right to ask questions about this research study and to have those questions answered by me before, during or after the research. If you have questions about the study, at any time feel free to contact W. Grant Willis from the Psychology Department at the University of Rhode Island (URI), at (401) 874-4245.

Additionally, you may contact the URI Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Rhode Island IRB may be reached by phone at (401) 874-4328 or by e-mail at researchintegrity@etal.uri.edu. You may also contact the URI Vice President for Research and Economic Development by phone at (401) 874-4576.
If you would like to keep a copy of this document for your records, please print or save this page now. You may also contact the researcher to request a copy.

ELECTRONIC CONSENT: Please select your choice below. You may print a copy of this consent form for your records. Clicking on the “Agree” button indicates that

- You have read and understand the above information
- You voluntarily agree to participate
- You are 18 years of age or older
- You have been diagnosed with an Eating Disorder in the last 5 years

☐ Agree

☐ Disagree
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