

Beyond anorexia and bulimia nervosa: what's "new" in eating disorders?

U. Volpe¹, A.R. Atti², M. Cimino¹, A.M. Monteleone¹, D. De Ronchi², F. Fernández-Aranda³, P. Monteleone⁴

¹ Department of Psychiatry, University of Naples SUN, Naples, Italy; ² Department of Biomedical and NeuroMotor Sciences, University of Bologna; ³ Department of Psychiatry, University Hospital of Bellvitge-IDIBELL and CIBER Fisiopatología Obesidad y Nutrición (CIBEROBN), ISCIII, Barcelona, Spain; ⁴ Neurosciences Section, Department of Medicine and Surgery, University of Salerno, Italy

Summary

Despite the fact that awareness of eating disorders (EDs) has grown during the past decades, the conceptualisation, psychopathological characterisation and clinical diagnosis of EDs has proven to be problematic for both researchers and clinicians. Presently, diagnostic criteria employed for anorexia nervosa (AN) and bulimia nervosa (BN) are unable to account for an exceedingly high number of individuals with clinically significant eating symptoms or to properly address new clinical prototypes of ED. The aim of this paper is to describe the developments and current limitations of EDs diagnoses, and to recapitulate the recent literature on emerging phenotypes. Descriptions of the symptoms and behaviours of ED patients with diabulimia, orthorexia, muscle dysmorphia, drunkorexia and nocturnal eating disorders are

featured with special focus on psychopathological classification and diagnostic ambiguity issues. An overview of non-specific eating and feeding disorders (EDNOS) in the newly released DSM-5 eating and feeding disorders section is also provided. Given the frequent transition between different phenotypes in patients with EDs and the common occurrence of individuals with clinically significant eating symptoms who evade diagnostic criteria, a better understanding and categorization of emerging EDs is required to guide psychiatric research and improve clinical outcomes.

Key-words

Compulsive behavior • Diabulimia • Drunkorexia • Eating disorders • Feeding disorders • Night eating syndrome • Orthorexia • Psychopathology • Vigorexia

Introduction

The first descriptions of self-starving for religious purposes dates to the Hellenistic era of the Roman Empire, and many anecdotal reports concerning disordered eating behaviours have continuously appeared throughout subsequent centuries¹. However, the first medical description of anorexia nervosa (AN) is usually attributed to the British physician Richard Morton in 1689. A more in-depth psychiatric approach to abnormal eating behaviours is attributable to the French neurologist Ernest C. Laségue and to the English physician Sir William W. Gull, who introduced the term "anorexia nervosa"². In 1873, both authors, almost simultaneously but yet independently, published seminal papers concerning the causes, clinical picture and course of AN³. Up to the second half of the 20th century, eating psychopathology paled in the shadows of psychiatric care and it received little scientific interest. Only after the publication by the German-American psychoanalyst Hilde Bruch of the book "The Golden Cage"⁴, disordered eating behaviours came to the attention of the general, medical and psychiatric audiences. This event was coupled with the other major prototypical eating disorder (ED) (i.e., bulimia nervosa; BN) being first described in 1979⁵. Although awareness of EDs has con-

stantly grown during past decades, their conceptualisation, psychopathological characterisation and clinical diagnosis has remained somewhat problematic. According to Uher and Rutter⁶, the nosological formulations of ED in both ICD-10 and DSM-IV were unsatisfactory for different reasons, including failure to characterise patients at various developmental stages, lack of continuity between childhood and adult feeding disorders and the difficulties in routine practice using those diagnostic criteria in both clinical practice and research settings. One of the main concerns of such clinical criteria is lack of/poor sensitivity and specificity: many patients presenting clinically significant eating-related psychopathology do not fulfill the diagnostic criteria, which in the end account only for a minority of affected individuals.

To settle such problems, both the American Psychiatric Association and the World Health Organization made significant changes in the latest revisions of DSM and ICD, respectively. ICD-11, for example, promises greater attention to cross-cultural validity, a more cogent life-course characterization, a more pronounced prototypical approach with greater modulation of diagnostic thresholds (e.g., a uniform 4-week criterion for the illness duration) and a revision of diagnostic boundaries to avoid the

Correspondence

Umberto Volpe, Department of Psychiatry, University of Naples SUN, Largo Madonna delle Grazie, 80138 Napoli, Italy • E-mail: umberto.volpe@unina2.it

inflation of “other disorders” categories. Unfortunately, as the ICD revision process has just entered its “beta phase” (2013–2017) and the revision process will be completed by the year 2018, many years will have to elapse before the impact of ICD-11 on ED clinical diagnosis and psychopathological conceptualisation can be determined.

The newly produced DSM-5⁷ attempted to correct the flaws of its previous edition, with the explicit aim to better represent the symptoms and behaviours of ED patients across their life-span. The most substantial changes introduced in the DSM-5 section on “Eating and Feeding Disorders” are the revision of the diagnostic criteria for AN (more focused on observable behaviours and with the amenorrhoea no longer needed for the diagnosis), and for BN (reduced frequency of binge eating and compensatory behaviours). In DSM-5, greater attention is given to binge eating disorder (BED) as a stand-alone diagnostic category, whereas three previously listed disorders within the “disorders usually first diagnosed in infancy, childhood or adolescence” are also included. The above changes were expected to minimise the use of catch-all diagnoses (e.g. “other specified”, EDNOS, or “unspecified” eating disorders) and make EDs diagnoses easier for the clinician. Several recently published studies are in line with such expectations: for instance, the use of DSM-5 criteria was associated with significantly less frequent residual eating disorder diagnoses in 150 adolescent and young adult residential female patients⁸, in 117 community outpatients⁹, 309 outpatients¹⁰ and even among adolescents from the community¹¹.

Nevertheless, current diagnostic criteria for AN and BN still do not account for the majority of individuals with clinically significant eating symptoms and new clinical prototypes for EDs have been described. The aim of the present paper is to provide an overview of the recent literature covering some of the emerging alleged EDs.

Diabulimia

Type 1 diabetes mellitus is an inflammatory autoimmune disease that leads to the destruction of insulin-producing pancreatic cells resulting in a lack of insulin. Besides having to take into account food intake and energy expenditure, in order to avoid hypo- and hyperglycaemia, multiple daily doses of insulin must be administered to diabetic patients. As the majority of patients with type I diabetes are children or adolescents, they may represent a high-risk population for ED. Recent reports highlight that adolescents with type I diabetes are twice as likely to experience an ED as non-diabetic ones¹² by exhibiting difficulties in maintaining optimal weight with increased risk of concerns about weight and body shape. Having abnormal eating behaviour in patients with diabetes can be especially challenging in order

to keep glycaemia under control since insulin encourages fat storage. Consequently, many people with type I diabetes attempt to reduce their insulin injections in order to induce/provoke weight loss^{13,14}.

The word ‘diabulimia’ refers to the deliberate omission or reduction of insulin use in individuals with type 1 diabetes with the specific purpose of weight control¹⁵. The association of intentional hypoglycaemia in patients with type I diabetes and BN/EDNOS has been recently reported^{16,17}.

Diabulimia does not represent a fully recognised medical condition yet, but it is receiving growing attention. The American Diabetes Association has acknowledged the existence of this condition for quite some time¹⁸ and it has been estimated that between 30 and 40% of adolescents and young women with diabetes skip insulin after meals¹⁹. The lack of proper insulin treatment may lead to many harmful conditions spanning from the short term risk of dehydration, breakdown of muscle tissue and fatigue, and kidney failure, retinopathy and cardiovascular and neuropathic complications over the long term²⁰; thus, diabulimia represents a potentially life-threatening disorder requiring immediate medical attention²¹. Furthermore, recent reports on the coexistence of type I diabetes and AN highlight the possible increased incidence of known diabetic complications (such as retinopathy and nephropathy) and peculiar difficulties in glucose control especially during “refeeding” phases²². These patients also present lower motivation to change their eating behaviours and a generally poorer prognosis¹⁷.

Specific screening questionnaires²³ and biological methods have recently been proposed to diagnose diabulimia. *Glycosylated haemoglobin* (HbA1c) is usually higher in diabetic patients with and without EDs, and the HbA1c pattern allows for the detection of intentional insulin omission for weight loss (usually with a pattern of initially stable HbA1c levels followed by both high HbA1c levels and wide fluctuations between visits)^{14,24}.

At present, neither specific diagnostic nor treatment guidelines are available²⁵; when diabetes and EDs co-occur, the clinician is left to make generic recommendations on the adherence to insulin treatment and correct diabetes self-management, in order to prevent complications in susceptible patients with only a generic focus on psychopathology and eating patterns.

Orthorexia

Orthorexia is a term used to describe a pathological obsession for “healthy” or “pure” food (e.g., free of herbicides or pesticides), with rigid avoidance of food believed to be unhealthy or polluted²⁶. The term “orthorexia” is derived from the combination of the Greek words “orthos” (which means accurate, right, correct, valid) and

"orexis" (which means hunger or appetite); the term is often used to designate an "obsession for healthy and proper nutrition" ²⁷. Of course, healthy eating habits are not pathologic *per se*; however, excessive preoccupation about consuming healthy food, spending an excessive amount of time on food thoughts, and experiencing associated dysfunctions suggest disturbed behaviour and/or personality ²⁸, and the disorder has been often dubbed as "a disease disguised as a virtue".

Although many hospital admissions might potentially be due to orthorexia, at least in the USA ²⁹, the disorder is not yet classified in any psychiatric diagnostic manual due to insufficient evidence. According to Donini et al. ²⁸, the prevalence of orthorexia in the general population is about 7%; however, in high-risk groups (such as healthcare professionals, dietitians or artistic performers) the prevalence may rise to approximately 50% ³⁰. Segura-Garcia et al. ³¹ reported that orthorexia symptoms are highly prevalent among patients with a previous diagnosis of AN or BN, with a tendency to undergo clinical improvement in AN and BN and migrate towards less severe forms of EDs ³².

Typically, orthorexic individuals follow a very rigid diet and reject many foods, due to their composition or elaboration (including those containing significant amounts of fat, sugar, salt, or other undesired components). They are either vegetarians, vegans, frugivores (i.e., eat only fruit) or crudivores (i.e., eat only raw food); furthermore, orthorexics typically refuse to eat away from home (due to lack of trust towards food preparation) and tend to feel morally superior, self-righteous and are at increased risk of social isolation ³³.

Such a restrictive dieting attitude may lead to several nutritional deficits and medical complications (such as osteopenia, anaemia, pancytopenia, hyponatraemia, metabolic acidosis and bradycardia), which closely resemble the quali-/quantitative malnutrition status typical of AN ³⁴. Several diagnostic criteria ³⁵ and rating scales (e.g., the ORTO-15 by Donini et al. ³⁶) for orthorexia have been proposed, but they have been only partially validated. Items are focused mainly on the "obsessional" preoccupation with eating "healthy foods", associated with significant psychosocial impairment after exclusion of other psychiatric, non-psychiatric and religious issues.

From a psychopathological viewpoint, orthorexia has been closely linked to AN and obsessive-compulsive personality/disorder ³⁷. The presence of recurrent, intrusive thoughts about food and health heighten worry over contamination and impurity. The overwhelming need to investigate source, processing and packaging of foods and to arrange food and eat in a ritualised manner make these behaviours similar to obsessive compulsive modalities, although with a highly ego-syntonic perception. Moreover, subjects with orthorexia seem to share

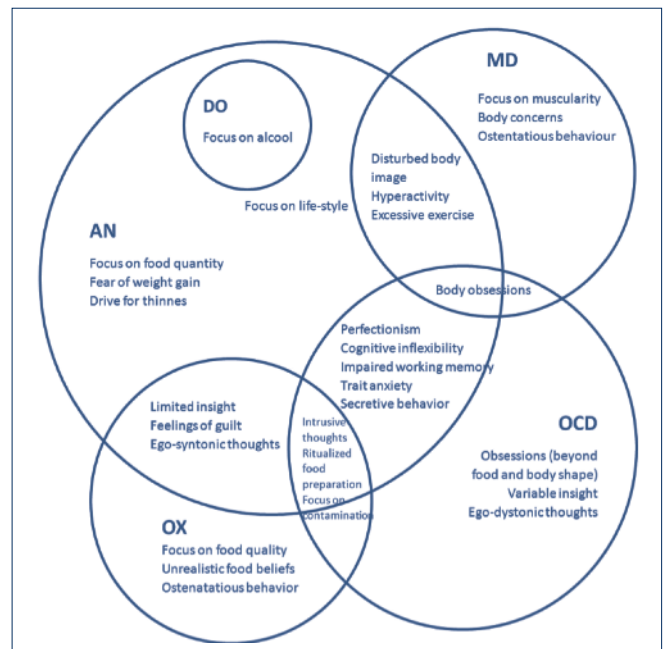


FIGURE 1.

Venn diagram representing the possible relationships between established and putative eating-related disorders (AN: anorexia nervosa; DO: drunkorexia; MD: muscle dysmorphia; OCD: obsessive-compulsive disorders; OX: orthorexia).

common traits of perfectionism, anxiety, need to exert control and valuing diet adherence as a proof of self-control (and deviation from the diet as a failure of self-control) with AN. Therefore, there is still an open debate regarding whether orthorexia is a unique disorder or just a subtype of anorexia or obsessive-compulsive disorder ³⁸. The empiric investigation of motivations and body perception (e.g., pursuit of an ideal body shape vs. keeping a healthy body), of ideation toward eating and food (e.g., worries about quantity vs. quality of food), of the level of illness insight/awareness (subjects with AN try to hide their habits whereas orthorexic individuals allegedly show off their behaviour) and of socio-demographic characteristics (e.g., sex distribution, level of education, access to food-related information) in clinical populations will probably shed further light on the true psychopathology of this syndrome. At present, orthorexia would most appropriately be categorised, within DSM-5 options, as "avoidant/restrictive food intake disorder" (ARFID), although it has been suggested that it may represent a distinct subtype ³⁹.

Muscle dysmorphia

Muscle dysmorphia (MD), also known as "vigorexia" or "bigorexia", is a body image-related psychological con-

dition in which normal or even unusually muscular; affected persons demonstrate an excessive focus on body appearance associated with the fear of being “small” or “puny”. Such fear leads to unwarranted physical exercise and increased body size⁴⁰. Usually, pathological preoccupation with one’s degree of muscularity causes severe subjective distress, impaired social and occupational functioning (due to the feelings of shame over their perceived appearance flaws and to their excessively time-consuming exercise schedule), and frequent abuse of anabolic steroids or other similar substances in an attempt to gain size⁴¹. Due to lifestyle modifications and substance abuse, MD can lead to serious health complications such as damage to muscles, joints and tendons, fatigue, acne, testicular atrophy, decreased sperm count, high blood pressure, high cholesterol, abnormal liver function, constipation, retention of water and intestinal gas⁴².

Although male body builders are thought to be at higher risk for MD, the few available studies tend to report that the number of affected females is increasing in relation to higher body image dissatisfaction and greater concern over physical appearance⁴³; however, no definitive figures regarding the real incidence of MD in the general population are yet available.

The condition was first observed by Pope et al.⁴⁴ in a sample of male body builders and was originally conceptualised as a “reverse” or “opposite” form of AN mainly because of the antithetical symptomatology in relation to body size. Indeed, individuals with MD tend to see their body size as excessively “small” and/or “weak” and, even though they may look normal or highly muscular, they wish to be larger and more muscular. Specific diagnostic criteria have been proposed for DM (Table I).

Despite continued investigation on the topic, contention surrounds MD nosology as it has been classified in different categories, with little consensus among researchers and clinicians. Over the years, MD has been linked to at least four different psychopathological realms: EDs, obsessive-compulsive disorder, body dysmorphic disorder and, more recently, behavioural addictions (in this case, addiction for a perfect muscular body⁴⁵). To reveal the psychopathological conundrum behind the diagnosis of MD⁴⁶, one could reflect on the fact that, although being historically conceptualised as a “reverse” eating disorder, MD should be classified as an obsessive-compulsive disorder within the DSM-5 and as hypochondriacal disorder within the ICD-10. Recent trends in psychopathology seem to favour the idea that it should be treated as a body dysmorphic disorder, in which a “muscle dysmorphia” specifier may have clinical utility^{47,48}. In order to define if MD really belongs to the EDs spectrum, a thorough exploration of the psychopathological elements

TABLE I.Proposed diagnostic criteria for muscle dysmorphia⁴².

A. Preoccupation with the idea that one’s body is not sufficiently lean and muscular. Characteristic associated behaviors include long hours of lifting weights and excessive attention to diet
B. The preoccupation is manifested by at least two of the following four criteria: <ol style="list-style-type: none"> 1. the individual frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain his or her workout routine and diet schedule 2. the individual avoids situations where his or her body is exposed to others, or endures such situations only with marked distress or intense anxiety 3. the preoccupation about the inadequacy of body size or musculature causes clinically significant distress or impairment in social, occupational, or other important areas of functioning 4. the individual continues to work out, diet, or use ergogenic substances despite knowledge of adverse physical or psychological consequences
C. The primary focus of the preoccupation and behaviors is on being too small or inadequately muscular, as distinguished from fear of being fat as in anorexia nervosa, or a primary preoccupation only with other aspects of appearance as in other forms of body dysmorphic disorder

associated to the syndrome (i.e., body mass, media influences, ideal body internalisation, low self-esteem, body dissatisfaction, health locus of control, negative affect, perfectionism and body distortion⁴⁹) is needed. A better understanding of the core psychopathology could guide psychiatric research and clinical practice as treatment for MD has to date largely utilised selective serotonin reuptake inhibitors and CBT only on the basis of uncontrolled case series and reports⁵⁰.

Drunkorexia

Drunkorexia is used to describe a disorder characterised by restricting food assumption, before alcohol is consumed or planned to be consumed, in order to avoid calorie intake⁵¹. Literature on the topic is very scarce, with only 6 related articles available in PubMed at the present moment. The available evidence tend to support the idea that drunkorexia is a relatively common activity among US college students with a reported 46% of prevalence within this population⁵². Young age, female sex, physical exercise, abnormal eating and heavy-drinking behaviours have been associated with a higher risk of develop-

ing drunkorexia^{53 54}. As this disorder combines the worse of drinking and the worse of dieting, the consequences involve not only drinking excessively on an empty stomach, but also dangerously altering nutrition.

Although a questionnaire providing a multidimensional measure of specific motivations and behaviors of drunkorexia has recently been proposed⁵⁵, it has not been validated yet.

Even though some authors⁵⁶ recently proposed that drunkorexia might be specifically related to weight concerns in line with the higher incidence among female heavy-drinkers with respect to males, the psychopathological characterisation of the syndrome is still very rudimentary. Further studies are needed to design focused interventions, which might aid in to safely reconciling pressure to be thin and participate in binge drinking.

Nocturnal eating disorders

Nighttime eating might occur in a variety of psychiatric syndromes, ranging from atypical forms of depression to binge eating. Moreover, two major psychiatric clinical entities characterised by abnormal meal timing have been described: "nocturnal eating syndrome" (NES) and sleep-related eating disorder (SRED).

NES was defined almost half a century ago by Stunkard et al.⁵⁷ as abnormal meal timing with nocturnal hyperphagia and morning anorexia, insomnia and awakening, in the absence of daytime EDs it typically occurred during periods of stress and was associated with poor outcomes of efforts to reduce weight. Throughout the years, NES has been conceptualised^{58 59} as a proper sleep disorder (and classified within the *First International Classification of Sleep Disorders*) or as a circadian rhythm disorder (with food intake being shifted towards the end of the day, interfering with sleep and decreasing satiety). Besides sleep reduction and fragmentation, the high scores obtained on several psychometric scales for eating symptomatology suggest that NES is psychopathologically related to EDs, although the amount of food consumed in the evening/night is not necessarily large and its disordered eating pattern is not better explained by BED, nor is any loss of control over food intake required^{60 61}. Due to its high comorbidity with obesity and other psychiatric conditions, NES represents a specific focus of attention for clinical care. Recent reports tend to confirm that NES is prevalent among psychiatric outpatients and associated with depression, impulse control disorder and nicotine dependency, especially when high degrees of body dissatisfaction are present^{62 63}.

Nonetheless, and in spite of the availability of several specific psychometric tools, NES is often neglected by

both health professionals and patients⁶⁴ and is practically ignored by major diagnostic systems (DSM-5 relegated it to the EDNOS category). However, the latest revision of its diagnostic criteria⁶⁵ (Table II) might increase the validity of the NES diagnosis and favour its inclusion in future updates of psychiatric diagnostic systems.

Another condition that poses a link between disordered eating and sleep dysfunction is SRED, which is characterised by recurrent episodes of eating at the transition from night-time sleep to arousal, with preference for high-caloric foods⁶⁶. The level of consciousness during SRED may vary widely (from partial consciousness to complete unawareness) and this might create some diagnostic ambiguity between SRED parasomnias and somnambulistic episodes⁶⁷. Furthermore, SRED is frequently associated with the use of psychotropic medications (particularly sedative-hypnotics) and other sleep disorders⁶⁸. Although it seems to share some pathophysiologic features with NES, several other aspects tend to clearly differentiate SRED from the latter and make it a candidate psychiatric disorder⁶⁹.

TABLE II.
Proposed research criteria for NES⁶⁵.

A. The daily pattern of eating demonstrates a significantly increased intake in the evening and/or nighttime, as manifested by one or both of the following: <ol style="list-style-type: none"> 1. at least 25% of food intake is consumed after the evening meal 2. at least two episodes of nocturnal eating per week
B. Awareness and recall of evening and nocturnal eating episodes are present
C. The clinical picture is characterized by at least three of the following features: <ol style="list-style-type: none"> 1. lack of desire to eat in the morning and/or breakfast is omitted on four or more mornings per week 2. presence of a strong urge to eat between dinner and sleep onset and/or during the night 3. sleep onset and/or sleep maintenance insomnia are present four or more nights per week 4. presence of a belief that one must eat in order to initiate or return to sleep 5. mood is frequently depressed and/or mood worsens in the evening
D. The disorder is associated with significant distress and/or impairment in functioning
E. The disordered pattern of eating has been maintained for at least 3 months
F. The disorder is not secondary to substance abuse or dependence, medical disorder, medication, or another psychiatric disorder

Other eating disorders

Some other clinical syndromes related to abnormal eating behaviour have been reported during the past decades. For the majority of them, many nosological controversies, mainly due to their relative clinical rarity and the consequent scarcity of empirically grounded data, still persist; given the concerns about their real prevalence in the general population and their long-term course, only some of these have been included in DSM-5 and will be

probably included in the upcoming ICD-11. A brief account of the disorders most frequently reported in the literature is provided in Table III.

Conclusions

The psychopathological definition of “non-threshold” EDs is still blurred, at least for some syndromic entities. However, given the fast rate by which alleged “new” EDs are described in the scientific literature, the field still requires

TABLE III.
Non-specific eating and feeding disorders and their inclusion into the DSM-5 eating and feeding disorders section.

Proposed eating syndrome	DSM-5 inclusion	Clinical features
Adult Pica	Yes	Pica is the persistent eating of non-food substances (including earth, chalk, metals, plastic objects, hair, faces, etc.). Traditionally included in the major diagnostic systems among conditions usually occurring during infancy or childhood, DSM-5 has recognized that adult presentations of pica may persist. Presently pica typically is given attention during adulthood, but the diagnosis is made only if the condition is severe, leads to adverse consequences and happens outside cultural or religious practices (Nicholls & Bryant-Waugh, 2009). Pica is frequently diagnosed during pregnancy and among people with intellectual disabilities and is rare among the general population, but recent reports tend to show that the prevalence of related behaviors might be higher among people with ED (Delaney et al., 2015)
ARFID	Yes	DSM-5 renamed infancy or early childhood feeding disorder as “avoidant/restrictive food intake disorder”(ARFID), adding significantly expanded criteria (Norris &Katzman, 2015). The syndrome, also dubbed “selective eating disorder”, is characterized by the inability to eat certain foods and strong preference for “safe” foods. Individuals may exclude whole food groups (such as fruits or vegetables) or the refusal maybe be based just on color or on specific brands. Patients with ARFID seem to be clinically distinct from those with AN or BN, as they tend to be significantly underweight with a longer duration of illness and a greater likelihood of comorbid medical and/or psychiatric symptoms (Fisher et al., 2014)
Choking phobia	No	Also known as “anginophobia”, “phagophobia” or “swallowing phobia”, this is rare clinical entity that is characterized by the phobic stimulus of swallowing that results in the avoidance of food or drinks, and ultimately to low weight, social withdrawal, anxiety and depression states (Lopez et al., 2014)
Emetophobia	No	Emetophobia is an intense and irrational anxiety pertaining to vomiting and/or nausea, which may lead to food avoidance and weight loss, because of its intense somatization mechanism (Boschen, 2006). The disorder is often hidden because of the associated shame among sufferers. Very little empirical data are available concerning its epidemiology, treatment and outcome. It is classified among specific phobias in ICD-10 and DSM-5 and seems to be comorbid with anxiety and depressive disorders, rather than with eating disorders (Sykes et al., 2015)
Food addiction	No	It has been proposed that some kind of foods may be potentially addictive and thus cause overeating and, in turn, obesity (Meule & Gearhardt, 2014). However, several concerns have been expressed with regard to the shift of focus from “eating addictive” behavior to the substance-based addiction model, especially because of the lack of systematic clinical and translational studies in this field (Hebebrand et al., 2014)
Grazing	No	Grazing is a relatively frequent behavior characterized by a repetitive eating pattern, often following bariatric surgery; since it has also been reported in eating disordered and community samples, and given its negative impact on weight outcomes after bariatric surgery, it is receiving greater attention, though the use of different definitions has prevented accurate measurements and comparison of data across studies (Conceição et al., 2014)

(continued)

Table III - Follows.

Proposed eating syndrome	DSM-5 inclusion	Clinical features
OSFED	Yes	The "Other Specified Feeding and Eating Disorders" (OSFED) have been included in the DSM-5 to specifically include all ED which do not fall into the ED "threshold"; recent investigations tend to highlight that it is difficult to discriminate OSFED from threshold ED because of genetic risk, prevalence and impairment (Fairweather-Schmidt & Wade, 2014)
Post-bariatric eating disorders	No	Specific forms of AN following bariatric surgery have been recently reported to persist even after long-term follow up and seem to be characterized by high degrees of disinhibition and impulsiveness (Tortorella et al., 2015). Current empirical evidence for the alleged disorder is very limited to distinguish it from other forms of AN. However, a recent literature review (Opolski et al., 2015) has proposed that many different eating -related psychopathological entities might follow bariatric surgery (i.e., binge eating disorder, grazing, night eating syndrome, emotional eating, food cravings and addiction, and pre-surgical expectations of post-surgical eating). Further investigations are required to define the prevalence, impact and characteristics of such conditions
Purging disorder	Yes	Purging disorder was recently included as an otherwise specified feeding or eating disorder (OSFED) in the DSM-5 and is characterized by recurrent purging behaviors (such as self-induced vomit, misuse of laxatives, diuretics or enemas) to control weight or shape, in the absence of binge eating episodes, in people with near-normal or normal weight; however, limited evidence is available on its prevalence, psychopathological characteristics and etiology (Munn-Chernoff et al., 2015)
Regurgitation disorder	Yes	Regurgitation disorder refers to the repetitive bringing back to mouth, spitting or re-chewing of previously swallowed food from the stomach. It was included in ICD-10 and DSM-IV under the name of "rumination disorder". However, since rumination is often used also to describe repetitive thinking in psychopathology, renaming the syndrome as "regurgitation disorder" has recently been proposed (Uher & Rutter, 2012)
UFED	Yes	DSM-5 lists an "unspecified feeding and eating disorder" (UFED) category, for those subjects whose symptoms do not meet any other diagnostic category but still cause clinically significant distress or impairment. Recent research suggested that within this category most of the cases are atypical forms of anorexia and overweight subjects struggling to lose weight and focusing on body weight/shape concerns (Wade & O'Shea, 2015)

great clinical attention by researchers and clinicians. Despite numerous biological, psychological and physical hallmarks of EDs have already been identified, and the role of environment has been recognised to increase the risk for disordered eating, the comprehension of potential new disease patterns is still superficial. Grasping emerging ED phenotypes in-depth is especially challenging because of symptom overlap and rapid transition between different phenotypes over time. Understanding whether they are new clinical entities or whether they encompass an existing major eating disorder will aid clinicians in managing such patients and policy makers in implementing prevention programs for vulnerable groups.

References

- Pearce JM, Richard Morton. *Origins of anorexia nervosa*. Eur Neurol 2004;52:191-2.
- Acland TD. *A Collection of the published writings of William Withey Gull: medical papers*. London: New Sydenham Society 1894.
- Vandereycken W, van Deth R. *Who was the first to describe anorexia nervosa: Gull or Lasègue?* Psychol Med 1989;19:837-45.
- Bruch H. *The Golden Cage – The enigma of anorexia nervosa*. Cambridge, MA: Harvard University Press 1978.
- Russell G. *Bulimia nervosa: an ominous variant of anorexia nervosa*. Psychol Med 1979;9:429-48.
- Uher R, Rutter M. *Classification of feeding and eating disorders: review of evidence and proposals for ICD-11*. World Psychiatry 2012;11:80-92.
- American Psychiatric Association. *Diagnostic and statistical manual of mental disorders - 5th ed*. Washington, DC: American Psychiatric Association Publishing 2013.
- Thomas JJ, Eddy KT, Murray HB, et al. *The impact of revised DSM-5 criteria on the relative distribution and inter-rater reliability of eating disorder diagnoses in a residential treatment setting*. Psychiatry Res 2015 [Epub ahead of print].
- Mancuso SG, Newton JR, Bosanac P, et al. *Classification of eating disorders: comparison of relative prevalence rates using DSM-IV and DSM-5 criteria*. Br J Psychiatry 2015;206:519-20.

- ¹⁰ Fisher M, Gonzalez M, Malizio J. *Eating disorders in adolescents: how does the DSM-5 change the diagnosis?* Int J Adolesc Med Health 2015 [Epub ahead of print].
- ¹¹ Flament MF, Henderson K, Buchholz A, et al. *Weight status and DSM-5 diagnoses of eating disorders in adolescents from the community.* J Am Acad Child Adolesc Psychiatry 2015;5:403-11.
- ¹² Jones J, Lawson M, Daneman D, et al. *Eating disorders in adolescent females with and without type 1 diabetes: cross sectional study.* BMJ 2000;320:1563-6.
- ¹³ Mathur R, Conrad M. *Diabulimia – Eating disorder.* 2008. Available at: <http://www.medicinenet.com/script/main/art.asp?articlekey=81960>. Accessed April 5, 2008.
- ¹⁴ Pinhas-Hamiel O, Hamiel U, Greenfield Y, et al. *Detecting intentional insulin omission for weight loss in girls with type 1 diabetes mellitus.* Int J Eat Disord 2013;46:819-25.
- ¹⁵ Hasken J, Kresl L, Nydegger T, et al. *Diabulimia and the role of school health personnel.* J Sch Health 2010;80:465-9.
- ¹⁶ Moosavi M, Kreisman S, Hall L. *Intentional hypoglycemia to control bingeing in a patient with type 1 diabetes and bulimia nervosa.* Can J Diabetes 2015;39:16-7.
- ¹⁷ Custal N, Arcelus J, Agüera Z, et al. *Treatment outcome of patients with comorbid type 1 diabetes and eating disorders.* BMC Psychiatry 2014;14:140.
- ¹⁸ Colton P, Rodin G, Bergenstal R, et al. *Eating disorders and diabetes: introduction and overview.* Diabetes Spectrum 2009;22:138-42.
- ¹⁹ Affenito SG, Adams CH. *Are eating disorders more prevalent in females with type 1 diabetes mellitus when the impact of insulin omission is considered?* Nutr Rev 2001;59:179-82.
- ²⁰ Wilson V. *Reflections on reducing insulin to lose weight.* Nurs Times 2012;108:21-2, 25.
- ²¹ Ruth-Sahd LA, Schneider M, Haagen B. *Diabulimia: what it is and how to recognize it in critical care.* Dimens Crit Care Nurs 2009;28:47-153.
- ²² Brown C, Mehler PS. *Anorexia nervosa complicated by diabetes mellitus: the case for permissive hyperglycemia.* Int J Eat Disord 2014;47:671-4.
- ²³ Pinhas-Hamiel O, Hamiel U, Levy-Shraga Y. *Eating disorders in adolescents with type 1 diabetes: challenges in diagnosis and treatment.* World J Diabetes 2015;6:517-26.
- ²⁴ Pinhas-Hamiel O, Levy-Shraga Y. *Eating disorders in adolescents with type 2 and type 1 diabetes.* Curr Diab Rep 2013;13:289-97.
- ²⁵ Davidson J. *Diabulimia: how eating disorders can affect adolescents with diabetes.* Nurs Stand 2014;29:44-9.
- ²⁶ Bratman S, Knight D. *Health food junkies; orthorexia nervosa: overcoming the obsession with healthful eating.* New York: Broadway Books 2001.
- ²⁷ Evilly S. *The price of perfection.* Br Nutr Found 2001;26:275-6.
- ²⁸ Donini LM, Marsili D, Graziani MP, et al. *Orthorexia nervosa: a preliminary study with a proposal for diagnosis and an attempt to measure the dimension of the phenomenon.* Eat Weight Disord 2004;9:151-7.
- ²⁹ Fugh-Berman A. *Health food junkies – Orthorexia nervosa: overcoming the obsession with healthful eating.* JAMA 2001;285:2255-6.
- ³⁰ Bağcı Bosi AT, Camur D, Güler C. *Prevalence of orthorexia nervosa in resident medical doctors in the faculty of medicine (Ankara, Turkey).* Appetite 2007;49:661-6.
- ³¹ Segura-Garcia C, Ramacciotti C, Rania M, et al. *The prevalence of orthorexia nervosa among eating disorder patients after treatment.* Eat Weight Disord 2015;20:161-6.
- ³² Fairburn CG, Wilson GT. *The dissemination and implementation of psychological treatments: problems and solutions.* Int J Eat Disord 2013;46:516-21.
- ³³ Catalina Zamora ML, Bote Bonaechea B, García Sánchez F, et al. *Orthorexia nervosa. A new eating behavior disorder?* Actas Esp Psiquiatr 2005;33:66-8.
- ³⁴ Park SW, Kim JY, Go GJ, et al. *Orthorexia nervosa with hyponatremia, subcutaneous emphysema, pneumomediastinum, pneumothorax, and pancytopenia.* Electrolyte Blood Press 2011;9:32-7.
- ³⁵ Moroze RM, Dunn TM, Craig Holland J, et al. *Microthinking about micronutrients: a case of transition from obsessions about healthy eating to near-fatal “orthorexia nervosa” and proposed diagnostic criteria.* Psychosomatics 2015;56:397-403.
- ³⁶ Donini LM, Marsili D, Graziani MP, et al. *Orthorexia nervosa: validation of a diagnosis questionnaire.* Eat Weight Disord 2005;10:e28-32.
- ³⁷ Vandereycken W. *Media hype, diagnostic fad or genuine disorder? Professionals’ opinions about night eating syndrome, orthorexia, muscle dysmorphia, and emetophobia.* Eat Disord 2011;19:145-55.
- ³⁸ Koven NS, Abry AW. *The clinical basis of orthorexia nervosa: emerging perspectives.* Treat 2015;11:385-94.
- ³⁹ Attia E, Becker AE, Bryant-Waugh R, et al. *Feeding and eating disorders in DSM-5.* Am J Psychiatry 2013;170:1237-9.
- ⁴⁰ Suffolk MT, Dovey TM, Goodwin H, et al. *Muscle dysmorphia: methodological issues, implications for research.* Eat Disord 2013;21:437-57.
- ⁴¹ Kanayama G, Barry S, Hudson JI, et al. *Body image and attitudes toward male roles in anabolic-androgenic steroid users.* Am J Psychiatry 2006;163:697-703.
- ⁴² Pope CG, Pope HG, Menard W, et al. *Clinical features of muscle dysmorphia among males with body dysmorphic disorder.* Body Image 2005;2:395-400.
- ⁴³ Leone JE, Sedory JE, Gray K. *Recognition and treatment of muscle dysmorphia and related body image disorders.* J Athl Train 2005;40:352-9.
- ⁴⁴ Pope HG, Katz DL, Hudson JI. *Anorexia nervosa and “reverse anorexia” among 108 male bodybuilders.* Compr Psychiatry 1993;34:406-9.
- ⁴⁵ Foster AC, Shorter GW, Griffiths MD. *Muscle dysmorphia: could it be classified as an addiction to body image?* J Behav Addict 2015;4:1-5.

- ⁴⁶ Murray SB, Rieger E, Touyz SW, et al. *Muscle dysmorphia and the DSM-V conundrum: where does it belong? A review paper.* *Int J Eat Disord* 2010;43:483-91.
- ⁴⁷ Phillips KA, Wilhelm S, Koran LM, et al. *Body dysmorphic disorder: some key issues for DSM-V.* *Depress Anxiety* 2010;27:573-91.
- ⁴⁸ Murray SB, Rieger E, Karlov L, et al. *An investigation of the transdiagnostic model of eating disorders in the context of muscle dysmorphia.* *Eur Eat Disorders Rev* 2013;21:160-4.
- ⁴⁹ Grieve FG. *A conceptual model of factors contributing to the development of muscle dysmorphia.* *Eat Disord* 2007;15:63-80.
- ⁵⁰ Grant JE. *Commentary on: Muscle dysmorphia: could it be classified as an addiction to body image?* *J Behav Addict* 2015;4:6-7.
- ⁵¹ Piazza-Gardner AK, Barry AE. *Appropriate terminology for the alcohol, eating, and physical activity relationship.* *J Am Coll Health* 2013;61:311-3.
- ⁵² Roosen KM, Mills JS. *Exploring the motives and mental health correlates of intentional food restriction prior to alcohol use in university students.* *J Health Psychol* 2015;20:875-86.
- ⁵³ Barry AE, Piazza-Gardner AK. *Drunkorexia: understanding the co-occurrence of alcohol consumption and eating/exercise weight management behaviors.* *J Am Coll Health* 2012;60:236-43.
- ⁵⁴ Barry AE, Whiteman S, Piazza-Gardner AK, et al. *Gender differences in the associations among body mass index, weight loss, exercise, and drinking among college students.* *J Am Coll Health* 2013;61:407-13.
- ⁵⁵ Ward RM, Galante M. *Development and initial validation of the drunkorexia motives and behaviors scales.* *Eat Behav* 2015;18:66-70.
- ⁵⁶ Eisenberg MH, Fitz CC. *"Drunkorexia": exploring the who and why of a disturbing trend in college students' eating and drinking behaviors.* *J Am Coll Health* 2014;62:570-7.
- ⁵⁷ Stunkard AJ, Grace WJ, Wolff HG. *The night-eating syndrome: a pattern of food intake among certain obese patients.* *Am J Med* 1955;19:78-86.
- ⁵⁸ Birketvedt GS, Florholmen J, Sundsfjord J, et al. *Behavioral and neuroendocrine characteristics of the night-eating syndrome.* *JAMA* 1999;282:657-63.
- ⁵⁹ Van der Wal JS. *Night eating syndrome: a critical review of the literature.* *Clin Psychol Rev* 2012;32:49-59.
- ⁶⁰ Striegel-Moore RH, Rosselli F, Wilson GT, et al. *Nocturnal eating: association with binge eating, obesity, and psychological distress.* *Int J Eat Disord* 2010;43:520-6.
- ⁶¹ Vinai P, Ferri R, Anelli M, et al. *New data on psychological traits and sleep profiles of patients affected by nocturnal eating.* *Sleep Med* 2015;16:746-53.
- ⁶² Saraçlı Ö, Atasoy N, Akdemir A, et al. *The prevalence and clinical features of the night eating syndrome in psychiatric out-patient population.* *Compr Psychiatry* 2015;57:79-84.
- ⁶³ Kucukgoncu S, Tek C, Bestepe E, et al. *Clinical features of night eating syndrome among depressed patients.* *Eur Eat Disord Rev* 2014;22:102-8.
- ⁶⁴ Kucukgoncu S, Midura M, Tek C. *Optimal management of night eating syndrome: challenges and solutions.* *Neuropsychiatr Dis Treat* 2015;11:751-60.
- ⁶⁵ Allison KC, Lundgren JD, O'Reardon JP, et al. *Proposed diagnostic criteria for night eating syndrome.* *Int J Eat Disord* 2010;43:241-7.
- ⁶⁶ Auger RR. *Sleep-related eating disorders.* *Psychiatry (Edgmont)* 2006;3:64-70.
- ⁶⁷ Brion A, Flamand M, Oudiette D, et al. *Sleep-related eating disorder versus sleepwalking: a controlled study.* *Sleep Med* 2012;13:1094-101.
- ⁶⁸ Inoue Y. *Sleep-related eating disorder and its associated conditions.* *Psychiatry Clin Neurosci* 2015;69:309-20.
- ⁶⁹ Vinai P, Ferri R, Ferini-Strambi L, et al. *Defining the borders between sleep-related eating disorder and night eating syndrome.* *Sleep Med* 2012;13:686-90.