Do the currently proposed DSM-5 criteria for anorexia nervosa adequately consider developmental aspects in children and adolescents?

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Abstract The purpose of this article is to discuss the proposed criteria of the fifth version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for anorexia nervosa (AN) and to compare these with an alternative proposal which is based on a broader conception of the AN phenotype (Hebebrand and Bulik, in press). The proposed DSM-5 criteria seem to only insufficiently resolve the problems inherent to the current classification of AN because (1) the A criterion does not include a reference to allow the clinician to decide if the (young) patient meets the weight criterion, (2) the AN patient first must have evolved the cognitive capacity for complex abstract reasoning in order to fulfill the criteria B and C (Bravender et al. in Eur Eat Disord Rev 18:79–89, 2010), (3) physical symptoms of starvation including the neuroendocrine dysfunction characteristic of AN are not a diagnostic requirement, and (4) the subtypes are not helpful for classification of younger patients who almost all have the restricting type. On these grounds the proposed DSM-5 criteria will perpetuate the diagnostic tradition of a high percentage of patients who are subsumed under the diagnostic label of eating disorders not otherwise specified (EDNOS), thus hampering both clinical practice and research. The use of our recently proposed alternative criteria for AN would result in most children and adolescents with an AN-like phenotype receiving a diagnosis of AN. Accordingly, our proposed criteria would be readily applicable to children, adolescents and adults.

Keywords DSM · Criteria · Eating disorders not otherwise specified · Anorexia nervosa · Children · Adolescents

Introduction

Recent studies have suggested revisions of the diagnostic criteria of the fourth version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) for Anorexia Nervosa (AN) due to several previously described classification problems [1–3]. The core problem resides in the high percentage of patients who do not fulfill all criteria for anorexia nervosa (AN) and who are thus subsumed under the diagnostic label of eating disorders not otherwise specified (EDNOS) [1]. As in affected adults, EDNOS predominates and is heterogeneous with regard to eating disorder pathology and associated features in adolescent clinical samples. For example, among 281 adolescent patients consecutively referred to an outpatient eating disorders service, 59% presented with EDNOS in contrast to only 20 and 21% of patients who received a diagnosis of AN or Bulimia Nervosa (BN), respectively [4]. The predominance of EDNOS has also been detected in population-based epidemiological studies of adolescents and young adults [5]. Based on the observation that patients with AN and subthreshold AN did not differ in terms of eating disorder pathology, depressive symptoms, and self-esteem, Eddy and co-workers [4] recommended a relaxation of the strict criteria for AN.
A second major problem concerns the temporal instability of eating disorders diagnoses and subtypes, which is related to developmental factors. Both clinical and epidemiologic studies demonstrate frequent crossover from AN to BN (8–54%) [6, 7], and to a lesser extent from BN to AN (4–27%) [7], typically within the first 5 years of illness [7]. The diagnostic subtypes are also not stable over time, for example, crossover from restricting to a binge-eating/purging type occurs frequently [8], particularly during adolescence and early adulthood [9]. Because children and adolescents with new onset of AN only infrequently present with the binge-eating/purging subtype [10], the diagnosis of the restricting subtype in young patients with a recent onset does not really help to differentiate the clinical presentations at this developmental stage.

Furthermore, the DSM-IV criteria B and C depend on the age-appropriate cognitive maturation for fulfillment [3]. Children and adolescents first must develop the capacity for complex abstract reasoning and the perception of the long-term negative consequences due to risk behavior, before they are able to endorse fear of weight gain or distortion in body image, respectively, denial of seriousness of low body weight despite their behaviors that contribute to harmful weight loss. Because the DSM-IV criteria do not pay recognition to such developmental factors, a percentage of young AN patients may not endorse or simply not have the respective symptoms and thus receive the diagnosis EDNOS [1, 3, 11]. Based on these observations, it again seems that the current diagnostic criteria for AN (and BN) are too narrow to allow for these frequent developmental changes; the underlying pathology is not captured adequately.

Herein we discuss the currently proposed criteria for the fifth version of DSM (DSM-5; see Table 1 for initial proposal and first update in February and May 2010, respectively, in comparison to DSM-IV criteria) for AN with a focus on developmental aspects pertinent to children and adolescents. We conclude by contrasting the current DSM-IV and proposed DSM-5 criteria (May 2010; see Table 1) with a novel set of criteria proposed by Hebebrand and Bulik [2] (Table 2), which in our opinion is better suited to broadly capture eating disorder pathology and which allows a better delineation of developmental factors.

The proposed DSM-5 A criterion

Based on previous criticism of the initial term ‘refusal to maintain body weight at or above a minimally normal weight for age and height’ in the DSM-IV A criterion [1, 2, 8], refusal has been omitted, because refusal implies an empirically unsubstantiated deliberate willful action of the patient and conveys a paternalistic and pejorative attitude [1, 8]. The novel proposed DSM-5 term “restriction of energy intake relative to requirements”, however, again poses problems: (a) the term could also be understood as an active, deliberate and willful behavior of the patient and could equally lead to pejorative attitudes, (b) the focus on the “restriction of energy intake” does not adequately address hyperactivity as a salient clinical feature in a substantial subset of AN patients, that is seemingly related to starvation-induced hypoleptinemia [12], (c) the term is not readily applicable to patients with the binge-eating/purging type, whose oral energy intake can actually exceed requirements, (d) it will prove difficult to clinically determine if energy intake is indeed too low in relationship to requirements; this can frequently merely be inferred based on the low body weight of an individual patient. Apart from the fact that there is no simple method to validly measure energy intake and expenditure [13], we have no information as to whether patients would indeed state that their energy intake is too low relative to energy requirements (for example within the context of a diagnostic interview). It is hard to envision that the underlying concept of energy homeostasis can readily be grasped by children.

The second change of the DSM-IV A criterion pertains to the weight criterion itself. The DSM-IV phrase “minimally normal weight for age and height” was originally maintained and subsequently altered to a “markedly low body weight” in the May 2010 update; such a ‘markedly low body weight’ is defined “as a weight that is less than minimally normal, or, for children and adolescents, less than that minimally expected for age and height”. Reference to “body weight less than 85% of that expected” (DSM-IV) has been omitted in the latest update. Obviously, uncertainty exists as to how to formalize the weight criterion; the central problem inherent to the DSM-IV and proposed DSM-5 weight criteria relates to the lack of a standard or reference basis for the important determination of whether a patient indeed has a body weight below a minimally normal weight for age and height or a markedly low body weight. Because of a substantial overlap of body weights of underweight healthy individuals and AN patients—85% of expected body weight roughly corresponds to the 10th BMI age centile [2, 8], a reference is required to allow the clinician to decide if the weight criterion is indeed fulfilled. It would appear appropriate to base this decision on the presence of symptoms of starvation (see Table 2). As long as these are not present, a proband’s underweight is not below her individual minimally normal body weight.

In practical terms, the provision of an epidemiological basis for the weight criterion would prove extremely valuable to clinicians—particularly those who treat young patients. We recommend the use of WHO definition of
underweight in adults (BMI < 18.5 kg/m²) and the 10th BMI age centile in children and adolescents as appropriate cut-offs. In comparison to DSM-IV, these weight specifications are somewhat relaxed. Accordingly, all patients who have previously been found to fulfill the DSM-IV weight criterion would also fulfill these novel criteria, because they are less strict than both 85% of expected body weight and a BMI < 17.5 kg/m²; the latter cut-off represents an alternative weight criterion delineated in the DSM-IV main text for AN. The relaxation of the weight criteria would result in a slightly higher rate of AN; furthermore, individuals who had previously been diagnosed as EDNOS would now receive a diagnosis of AN. The requirement of symptoms of starvation overcomes the inherent lower specificity of the use of these developmentally appropriate weight thresholds. In general terms, the use of BMI for classification of underweight is strongly recommended to bridge the gap to other medical specialities; e.g., the American Academy for Pediatrics recommend routine BMI screening [14], which, in addition for screening for risk of overweight and obesity, could serve as a simultaneously useful tool for screening AN.

The proposed DSM-5 B criterion

The second criterion also includes two changes (see Table 1, right column). The word “underweight” was rephrased to the new term “markedly low weight” as in the A criterion. As with the other criteria, sensitivity and specificity require attention. Seemingly, there is a general reluctance to merely refer to weight phobia as a symptom of AN, because of its high prevalence in the general population; specificity of the symptom is thus low. Nevertheless, specificity is not increased by redundantly referring to the ‘markedly low body weight’, the presence of which is already required in the A criterion.

The second change pertains to the novel term “persistent behavior to avoid weight gain” as an alternative to the symptom “intense fear of gaining weight or becoming fat”.

<table>
<thead>
<tr>
<th>DSM-IV criteria</th>
<th>DSM-5 criteria, original proposal February 2010</th>
<th>DSM-5 criteria, update May 2010</th>
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<tbody>
<tr>
<td>A. Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss leading to maintenance of body weight less than 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected)</td>
<td>A. Restriction of food intake relative to caloric requirements leading to the maintenance of a body weight less than a minimally normal weight for age and height (e.g., weight loss leading to maintenance of body weight less than 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected)</td>
<td>A. Restriction of energy intake relative to requirements leading to a markedly low body weight. Markedly low weight is defined as a weight that is less than minimally normal, or, for children and adolescents, less than that minimally expected for age and height</td>
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<tr>
<td>B. Intense fear of gaining weight or becoming fat, even though underweight</td>
<td>B. Intense fear of gaining weight or becoming fat, even though underweight, or persistent behavior to avoid weight gain, even though underweight</td>
<td>B. Intense fear of gaining weight or becoming fat, or persistent behavior to avoid weight gain, even though at a markedly low weight</td>
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<tr>
<td>C. Disturbance in the way in which one’s body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight</td>
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<tr>
<td>D. In postmenarcheal females, amenorrhea, i.e., the absence of at least three consecutive menstrual cycles (a woman is considered to have amenorrhea if her periods occur only following hormone, e.g., estrogen, administration)</td>
<td>D. Omitted</td>
<td>D. Omitted</td>
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Specify type Specify current type Specify current type

Restricting type. During the current episode of anorexia nervosa, the person has not regularly engaged in binge-eating/purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas)

Restricting type. During the last 3 months, the person has not engaged in recurrent episodes of binge-eating/purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas)

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This persistent behavior again suggests an active, goal-orientated behavior on part of the patient. It remains unclear whether the patient would need to endorse one of these symptoms to receive a diagnosis or if the diagnosis should rely on the inference of the clinician. This aspect is not trivial, as specific patients might not endorse having such symptoms. We as well as others [1, 3] assume that many underweight eating disordered patients—in particular at younger ages—do not experience their behavior as an attempt to avoid weight gain; they also do not report an intense fear of gaining weight or becoming fat. In our experience, this lack of weight phobia upon initial referral at a younger age frequently disappears during the therapeutic process, perhaps in relationship to therapeutically induced weight gain.

According to Bravender et al. [11], the current diagnostic criteria are not sensitive to the timing of neurocognitive maturation in children and adolescents with AN; usually, formal thought defined as the ability to integrate two or more low-order, concrete processes to arrive at an intangible higher order process, develops around 11–13 years old, while the capacity for complex abstract reasoning develops into late adolescence, which is a necessary requirement for fulfillment of this criterion [3]. In light of the aforementioned developmental considerations, lack of endorsement of weight phobia and the fact that this symptom complex potentially relies on a Westernized socio-cultural background, we recommend that additional cognitions/subjective experiences frequently

### Table 2

**Alternative proposal for DSM-5 criteria for anorexia nervosa**

A. Underweight associated with symptoms of starvation as defined by both
   
   1. Body mass index (BMI) < 18.5 kg/m² in adults or BMI < 10th age percentile of gender-matched reference population in youth <18 years
   
   2. Presence of two or more physical symptoms indicative of physiological adaptation to starvation [e.g., substantial loss of fat mass, loss of muscle mass, weak muscles, fatigue, dizziness, dry skin, nails and hair, fine (lanugo) hair over body, thinning and/or breaking of hair, hair loss, amenorrhea, bradycardia, arhythmias, hypotension, hyperthermia, cold intolerance, constipation, osteoporosis, bone fractures, dehydration, low blood cell counts, hypoalbuminemia]

B. Presence of one or more behaviors, which likely result in, maintain, or exacerbate underweight and/or which indicate disordered eating behavior
   
   1. Behavior(s) indicative of insufficient energy intake [e.g., avoidance of certain foods or types of foods (e.g., energy dense foods), only eating small amounts of food at a time, intermittent fasting, ritualized or prolonged eating of small amounts of food, early termination of meals, or induction of reduced appetite or palatability (e.g., water loading, use of appetite suppressant, excessive use of condiments, or sweeteners)]
   
   2. Behavior(s) indicative of prevention or reduction of absorption of nutrients, i.e., purging, e.g., vomiting, ruminating, use of laxatives, enemas, or other methods
   
   3. Behavior(s) indicative of high energy expenditure (e.g., motor restlessness, hyperactivity, aerobic or isometric exercise, under-dressing in cold climate, cold showers, use of medications to elevate resting energy expenditure)
   
   4. Behaviors that reduce total body water (use of diuretics, low fluid intake)
   
   5. Recurrent episodes of binge eating (at least one episode of binge eating per week for a period of 3 months; for definition of an episode of binge eating see criterion A of BN)

C. Presence of one or more of the following cognitions or subjective experiences
   
   1. Fear of gaining weight and/or becoming fat
   
   2. Continued desire to lose weight or maintain underweight
   
   3. Undue influence of body weight or shape on self-evaluation, disturbance in the way in which one’s body weight or shape is experienced or evaluated and/or preoccupation with shape and/or weight
   
   4. Undue influence of food intake on self-evaluation or mood (e.g., the patient derives reinforcement from the ability to control food intake; minor fluctuations in weight strongly influence mood)
   
   5. Persistent preoccupation with food and/or nutrition (e.g., reports frequently or constantly thinking about food or weight)
   
   6. Lack of concern about the physiological and psychological consequences of underweight (e.g., patient labels her or his state as normal or safe)
   
   7. Irritability, social withdrawal, depressed mood
   
   8. Reduced or absence of libido

D. The underweight and the associated behaviors cannot better be explained by other general medical conditions (e.g., infectious, neoplastic or endocrine disorders, malabsorption) or psychiatric disorders (e.g., schizophrenia, affective disorder, obsessive compulsive disorder) or strong personal motives/aims independent of the wish to lose weight, which are comprehensible and plausible to outside observers (e.g., hunger strike)

**Subtype specification.** Purging type if B2 applies; binge-eating type if B5 applies, binge-eating/purging type if B2 and B4 apply
encountered in AN are included as symptoms of the respective criterion (see Table 2). We advocate separating AN behaviors and cognitions/subjective experiences via two different criteria (see our alternative B and C criteria).

The proposed DSM-5 C criterion

The stigmatizing word "denial" (similar to "refusal" in DSM-IV criterion A) was omitted and replaced with "persistent lack of recognition of the seriousness of the current low weight". However, no explanation is provided as to how and by whom to judge the "seriousness" of low weight. As in criterion A a reference basis should be provided to objectively conclude that the low weight is indeed serious. Only such a basis would ensure that physicians/therapists would agree on the seriousness of the underweight of a particular individual. It again seems appropriate to use the presence of starvation-related symptoms as the decision basis.

To meet the proposed DSM-5 C criterion, the AN patient must have the cognitive capacity to understand the seriousness and short- and long-term risks of underweight. Previous studies suggest that preadolescents have difficulty in perceiving the relative risk of alternative outcomes, while adolescents may exhibit difficulties in appreciating distal negative consequences [3].

Omission of the DSM-IV D criterion

The use of amenorrhea in the diagnosis of AN has been questioned previously [15]; the DSM-5 Eating Disorder Working Group has now proposed to omit the DSM-IV D criterion. From a developmental perspective, the DSM-IV D criterion is not applicable to prepubescent females and is not reliably reported by patients [3]. Amenorrhea is, however, the only symptom which pertains to the starvation-related neuroendocrine dysfunction characteristic of AN.

Subtypes and sub-threshold AN

The definitions of the two DSM-IV subtypes for AN were not changed by the DSM-5 Working Group (see Table 1). As described in "Introduction", the diagnostic subtypes are not stable over time; a modification of these subtypes has been proposed to allow for the crossing over between the subtypes [3, 8]. Because of the initial presentation of young patients with mainly the restricting type, the subtypes are of limited value only for further delineating the symptomatology in children and adolescents.

DSM-5 does not specify a subthreshold or atypical type of AN for clinically relevant cases who meet only two of the three novel criteria. Only a diagnosis of EDNOS would be possible in such cases. Only three theoretical combinations are applicable (A + B, B + C, A + C), if two AN criteria would be required for the EDNOS diagnosis; accordingly all three combinations would include a markedly low body weight (required for both the proposed A and B criteria). Accordingly, atypical AN or EDNOS with an AN-like phenotype cannot be diagnosed in individuals who do not (yet) have a markedly low body weight, unless an EDNOS diagnosis would also be possible if just one of the three proposed criteria is met. However, requirement of the presence of merely a single criterion for the diagnosis of an eating disorder appears problematic due to the low specificity. To avoid a clinically too heterogeneous EDNOS diagnosis, the tenth revision of the International Classification of Diseases (ICD-10) of the WHO (http://apps.who.int/classifications/apps/icd/icd10online/) allows the diagnosis of atypical AN and BN.

In a retrospective study, Peebles et al. [16] recently showed that after subcategorization of EDNOS patients into partial AN (pAN) and partial BN (pBN) subgroups (at least one criterion of the respective DSM-IV criteria was missing) a substantial number of adolescent patients of the pAN group proved to be medically similar to the patients with AN; the patients with pAN, in general, were younger, had significantly higher heart rates, systolic blood pressure and temperature, weighed significantly more but had lost weight more rapidly than those with AN. They did not differ on most other medical outcomes. Peebles and co-workers [16] therefore support modifications in the diagnostic criteria for adolescents with ED with regard to medical and psychiatric interventions.

In conclusion, the DSM-5 Eating Disorder Working Group needs to critically examine the reliance on only three criteria to determine a diagnosis of AN and the implications of this practice for the diagnosis of EDNOS. Without broadening the AN phenotype including a focus on symptoms relevant to and prevalent in children and adolescents, the proposed DSM-5 criteria will perpetuate the diagnostic tradition of high rates of EDNOS diagnoses; conceivably, seriously ill patients with an AN-like phenotype would fulfill only one AN criterion.

Conceptions and an alternative proposal to the DSM-5 criteria for AN in consideration of developmental aspects in children and adolescents

In response to the online publication of the proposed DSM-5 criteria, Hebebrand and Bulik (in press) [3] (see Table 2) recently proposed alterations to a set of novel criteria...
originally published by Hebebrand et al. [8]. These criteria are based on the premise that the core symptomatology of AN rests on the intertwining of the primary behaviors with the psychological and physical consequences of starvation. The respective article was available to the DSM-5 Eating Disorders Working Group, which subsequently published an update of the initial draft (see initial proposal and update in Table 1).

For the A criterion, Hebebrand and Bulik suggest the requirement of the combination of underweight (see Table 2, below A1) defined via the widely accepted WHO classification (http://apps.who.int/bmi/index.jsp?introPage=intro_3.html) by a BMI < 18.5 kg/m² in adults and <10th BMI age centile in children and adolescents (http://www.who.int/growthref/en/) based on population-based reference samples [17] together with at least two symptoms of starvation (see Table 2, below A2) to differentiate the disorder from weight control and dieting behaviors, which do not include overt symptoms of the adaptation to starvation. This criterion can be applied to from infancy into adulthood.

The proposed B criterion lists behaviors that likely result in, maintain or exacerbate underweight and/or which indicate disordered eating behavior, thus paying reference to the cardinal feature of any eating disorder; most of the listed behaviors can readily be observed clinically by the diagnostician. Again, the criterion is applicable to all age groups; the restricted energy intake of young children can be classified under B1. The proposed C criterion lists a range of cognitions and subjective experiences typically encountered in AN patients, which include the proposed DSM-5 C criterion. Similar to the alternative B criterion, only one symptom is required to fulfill the C criterion (see Table 2, below B and C). In young children with an AN-like phenotype, irritability, social withdrawal, and/or depressed mood (see C7) represent a common finding, thus again entailing applicability of the C criterion in this age group. Furthermore, C7 allows classification of older children and adolescents who either do not have or negate having weight phobia and a body image disturbance.

The requirement of only a single B and C symptom circumvents the problems inherent to having to infer behaviors or cognitions and uncertainties due to potential negations of single symptoms; some of the symptoms are broadly defined and are readily discernible by an outside observer. The provision of duration criteria for both the behaviors and cognitions listed in the B and C criteria do not appear necessary in light of the fact that the respective individual must also fulfill the A criterion including symptoms of starvation. Furthermore, the authors suggest to add an exclusion criterion to ensure that the diagnostician has excluded other causes of the observed symptoms (see Table 2, below D); apart from other psychiatric and somatic disorders other goal-oriented behaviors, which are readily recognizable by an outside observer, such as a hunger strike need to be excluded.

Finally, Hebebrand and Bulik [2] suggest subcategorization of the two current existing subtypes into three (purging type, binge-eating type and binge-eating/purging type; see Table 2, below Subtype specification). We assume that most AN-like clinical presentations could be diagnosed as AN upon use of these alternative criteria; an atypical form of AN can be diagnosed in individuals who fulfill the A2 criterion, but have a body weight above the weight threshold as defined in A1. A second atypical form is conceivable for those individuals who fulfill A1 but not A2 [3].

With this proposal the authors pursue the following aims: (1) a substantial subgroup of patients currently diagnosed as EDNOS should receive the more appropriate diagnosis of a more broadly defined AN, (2) due to a broad range of behaviors and cognitions and subjective experiences, developmental factors and longitudinal symptom fluctuations would be better accounted for; patients would likely fulfill the criteria irrespective of age and stage of the disorder, (3) due to the inclusion of several behaviors and cognitions, both clinical evaluations and research would profit from a more precise description of the clinical symptoms and course of AN; it will become possible to better delineate the symptoms that characterize patients with a recent onset as compared to those with a chronic course and in general terms observe how the disorder changes over time and varies by age at presentation, (4) the criteria also allow for the classification of atypical AN patients who merely do not fulfill the weight criterion or who do not show symptoms of starvation.

**Conclusion**

AN is a disorder with clear and documentable somatic symptoms, behavioral features and cognitions, which differ depending on age and stage of the disorder. We favor a broad definition to circumvent the current practice of classifying many patients with an AN-like phenotype as EDNOS. The proposed DSM-5 criteria seem to only insufficiently resolve the problems inherent to the current classification of AN, that hamper both clinical practice and research. Our proposed criteria are readily applicable from childhood through adulthood. We believe that future DSM revisions should be based on easy-to-apply and replicable diagnostic criteria which take developmental considerations into account and which can be used by clinicians and researchers irrespective of whether they view AN as a primarily biological, psychological, or culturally driven disorder.

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Note added in proof After acceptance of this article the DSM-5 Working Group has published the second revised version of the proposed DSM-5 criteria for AN; the changes concern only the criteria A and B (see http://www.dsm5.org/ProposedRevisions/Pages/proposedrevision.aspx?rid=24). In criterion A the term “markedly low body weight” was exchanged with “significantly low body weight in the context of age, sex, developmental trajectory, and physical health”. The reference to physical health now implies that all individuals who have a medical disease associated with weight loss and underweight (e.g. cancer, systemic infection, endocrine disorders) fulfill the A criterion. In criterion B the term “persistent behavior to avoid weight gain” was extended to “persistent behavior that interferes with weight gain”. Because this type of behavior is common, it is of low specificity. Furthermore, persistence is difficult to assess; would a patient with intermittent binge eating attacks qualify for this symptom? In conclusion, the core problems in the classification of AN, described in this article (including the problems in the demarcation to the diagnosis of EDNOS), are still in our opinion insufficiently resolved.

References