



THEME

Adolescence



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Eating disorders in adolescents

BACKGROUND

The overall prevalence of eating disorders among children and adolescents is rising – the younger age group are more likely to present with anorexia nervosa (AN), while the older adolescent can present with either AN or bulimia nervosa (BN). However, eating disorders exist as part of a spectrum and general practitioners will encounter many adolescents that have an eating disorder that do not yet fulfil diagnostic criteria for either AN or BN.

OBJECTIVE

This article aims to provide an overview of assessment and principles of management of eating disorders in the adolescent patient.

DISCUSSION

General practitioners are key in recognising and offering early intervention in cases of incipient eating disorders or problem dieting behaviour. The physical findings of AN are those of protein calorie malnutrition, while in BN, they reflect chronic purging. Failure of outpatient management requires hospitalisation for nutritional rehabilitation with close monitoring of fluid and electrolyte status to prevent the development of refeeding syndrome. Family involvement is vital, particularly in the younger patient, with ongoing family therapy offering the best outcomes.

Dieting behaviours in adolescents are widespread and impact on the prevalence of eating disorders.¹ The lifetime prevalence of anorexia nervosa (AN) is 0.4–3.7%; for bulimia nervosa (BN) it is 1.2–4.2%.^{1–5} In adolescence a 'partial syndrome' or 'eating disorder otherwise not specified' occurs more commonly than either AN or BN. In these conditions there is disordered eating without the full diagnostic criteria of either AN or BN.⁶ Eating disorders occur equally in males and females before puberty with the ratio increasing to approximately 1:10 during adolescence and 1:20 during young adulthood.^{3,4,7} There has however, been a recent rise in the presentation of adolescent males with eating disorders, temporally associated with the 'skinny jeans' phenomenon noted in the media. Eating disorders are the third commonest chronic illness in adolescence behind obesity and asthma.^{1,7–9}

Younger adolescents tend to present with AN, while older adolescents may present with either BN or AN.^{4,7} Eating disorders can be considered to exist within a spectrum, with 10–30% of patients crossing over between anorexic and bulimic tendencies during the

course of their illness.^{4,10}

The aetiology of eating disorders is widely accepted to be a combination of genetic, psychological and sociocultural factors, ie. they are bio-psycho-social disorders.^{4,7} The onset of AN is most commonly associated with puberty and its changes, and, in general, the development of an eating disorder occurs in the context of an adolescent seeking to cope with a perceived stress. Eating disorders seem to also be more common in young people who have recently immigrated, even when eating disorders are uncommon in their country of origin.^{7,11} The behaviours they adopt seem purposeful to the adolescent, despite the significant, paradoxical and adverse effects these behaviours have on their health.

Adolescents with AN are usually high achievers and are often involved in a number of extracurricular activities such as tutoring, volunteer work and community leadership, as the driven focus required to successfully maintain an eating disorder extends to other areas of their lives. They tend to be perfectionists, have internalising coping styles and obsessive behaviours, often with comorbid mood symptoms such as depression and obsessive compulsive disorder (OCD).^{1,4,7} In addition, the family dynamics

commonly seen in families of teenagers with AN include conflict avoidance, undue degrees of enmeshment with either parent and rigid or overprotective parenting.

In BN, the commonest comorbidities include depression and other mood disorders as well as impulse control problems including externalising acting out behaviours such as alcohol or drug abuse and sexual promiscuity.⁷

Presentation

One of the most common presentations of AN (*Table 1*) to general practice is parental concern about the adolescent's weight loss associated with an altered relationship to food, deranged eating behaviours, and social isolation.¹² The behaviours of concern include skipping meals, reducing meal portion size or leaving food behind when served a normal portion, vomiting, and exercising compulsively to lose weight. In females, new onset amenorrhoea (absence of three consecutive menstrual cycles after menarche) is a common presenting complaint. Less common presentations include general malaise and lack of energy, increasing episodes of lightheadedness and exercise intolerance, and poor school performance with academic decline. Chest pains and syncope are associated with increased disease severity.

Bulimia nervosa is characterised by binge/purge cycles which persist for greater than 3 months and occur at least twice per week (*Table 2*).¹² In these patients, weight may fluctuate although they are not underweight, while menses are usually present, although sometimes irregular. Patients commonly self refer requesting help to eat healthily and break the binge/purge pattern. Parental concern is similarly common, although the abnormal eating behaviours are typically secretive and only suspected from the 'disappearance' of food. Occasionally, the adolescent presents with a related concern such as epigastric pain. When vomiting occurs daily and over extended periods, BN may be suspected at dental visits from the observation of enamel erosion or sensitivity to hot and cold foods.

Diagnosis and assessment

There are a number of standardised instruments to screen for eating disorders. The most commonly used include the Eating Attitudes Test (EAT),^{13,14} a brief questionnaire with 26 lifestyle questions, and the SCOFF questionnaire, a simple to use and score set of questions designed to raise suspicion of an eating disorder rather than to diagnose one (*Table 3*).¹⁵

The diagnosis of eating disorders can also be made from history and examination. It is important to quantify any weight loss and determine the date of the adolescent's maximum and minimum weight and the weight loss

Table 1. DSM-IV diagnostic criteria for anorexia nervosa*¹²

- Refusal to maintain body weight at or above a minimally normal weight for age and height (ie. weight loss, or failure to make expected weight gain during period of growth leading to body weight less than 85% expected)
- Intense fear of gaining weight or becoming fat, even though underweight
- 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
- Amenorrhoea in postmenarcheal females (ie. the absence of at least three consecutive menstrual cycles)

* Specified to be binge eating/purging or restricting type depending on whether there has been regular binge eating and/or purging behaviour (self induced vomiting or the misuse of laxatives, diuretics or enemas) or there has not, respectively

Table 2. DSM-IV diagnostic criteria for bulimia nervosa*¹²

- Recurrent episodes of binge eating characterised by both of the following:
 - eating in a discrete period of time (eg. within any 2 hour period) more food than most people would eat during a similar period of time and under similar circumstances
 - a sense of lack of control over the eating during the episode (eg. a feeling that one cannot stop eating or control what or how much one is eating)
- Recurrent inappropriate compensatory behaviour in order to prevent weight gain such as self induced vomiting; misuse of laxatives, diuretics, enemas or other medication; fasting; or excessive exercise
- Binge eating and inappropriate compensatory behaviours both occur on average, at least twice a week for 3 months
- Self evaluation is unduly influenced by body shape and weight

* Specified to be purging or nonpurging type depending on whether there has been regular self induced vomiting or the misuse of laxatives, diuretics or enemas, or there has been other inappropriate compensatory behaviour (such as fasting or excessive exercise) instead

strategy used. Their feelings about their current weight, their desired weight (desire for thinness) and body image need to be explored while also establishing whether there is any fear of weight gain (*Table 1*).

In exploring the weight loss strategy, closed and specific questions are more likely to yield responses. In particular, one needs to ask whether they are:

- restricting their dietary intake (skipping meals, cutting portion sizes)
- purging (over exercising, vomiting, laxative misuse), or
- both.

The reported oral intake for a typical day should be recorded, as should the specific type and amount of exercise done each day. The patient will frequently make statements such as 'around the usual amount' or 'the normal amount' but the actual behaviour may be well

outside the 'normal range'. Therefore quantifying training sessions, gym work (cardiovascular versus resistance training) and time walking/jogging (including walking to and from school) is important. It is also not unusual for adolescents to exercise privately for 2 hours or more each day, including hundreds of sit-ups and push-ups, which they tend not to mention unless asked about.

In females, it is important to inquire about age of menarche, regularity of menses, and whether or not they are taking an oral contraceptive pill.

In suspected cases of bulimia nervosa, the oral intake for a typical day should also be elicited, with:

- specific questions about bingeing behaviour (how often, time of day, typical food and amount eaten during a binge), and
- whether binges are followed by vomiting or other compensatory behaviour.

The usual pattern involves little food intake throughout the day, with an after school binge, due to hunger and sometimes boredom, often followed by vomiting; sometimes the bingeing takes place at night when the family is asleep. The vomiting, and usually further dietary restriction the next day, are the commonest measures taken to compensate for the bingeing – but this leads to hunger and sets up a pattern that can be incredibly hard for the adolescent to break (*Table 2*).

In addition, it is important to explore the context in which the adolescent has developed an eating disorder. When interviewing an adolescent the mnemonic HEEADSSS (**h**ome, **e**ducation/**e**mployment, **e**ating, **p**eer

group **a**ctivities, **d**rugs, **s**exuality, **s**uicide/depression and **s**afety from violence) is a most useful psychosocial screening tool, which, asked in sequence, assists in building rapport.⁹ Use of this tool flags any areas of concern to the adolescent while enabling the clinician to identify other issues that need further exploration such as altered body image and eating patterns suggestive of a possible eating disorder.

Physical examination

As with children, the assessment of adolescents presenting to general practice needs to include serial measurement of height and weight. A longitudinal view of development offers comparison to standardised norms and reveals any deviation from the expected growth trajectory. Crossing of centiles indicates failure to thrive and may indicate an eating disorder. In addition to general growth, progression through the Tanner stages of pubertal development should be recorded on the growth charts. An adolescent is expected to advance by one pubertal stage every 12 months. Protein calorie malnutrition associated with eating disorders such as AN however, results in delayed growth and progression of puberty.¹⁶ As well as these measures of macronutrient deficiency, patients with AN may also have micronutrient deficiency, although this is uncommon.

The general impression of adolescents with AN is that they share clinical features commonly seen in hypothyroidism. These physical findings commonly only become apparent when the young person is examined, as they tend to 'cover' their bodies with loose clothing. The protein calorie malnutrition leads to loss of fat and muscle wasting with associated weakness and diminished tendon reflexes. These patients often appear wan, with dry/brittle hair and can have slow mentation and locomotion. They often have lanugo hair (fine downy hair), and decreased peripheral circulation with a low volume and low pressure circulation. Acral cyanosis and decreased pulse rate, pulse volume, blood pressure and temperature are associated with greater degrees of protein calorie malnutrition and, therefore, disease severity.

Admission to hospital for medical stabilisation is recommended when the heart rate is <50 bpm, blood pressure is <80 mmHg systolic, or temperature <35.5°C (*Table 4*).^{1,2}

In contrast, patients with BN tend to be in the healthy weight range or overweight, with the only clinical signs often being parotid enlargement, enamel erosion with carious teeth (lingual surfaces), and calluses over the knuckles from persistent vomiting.^{1,4} Vomiting may also cause electrolyte disturbances: low potassium and the raised serum amylase.^{4,7}

Table 3. The SCOFF questions*

Do you make yourself **S**ick because you feel uncomfortably full?
Do you worry you have lost **C**ontrol over how much you eat?
Have you recently lost more than **O**ne stone in a 3 month period?
Do you believe yourself to be **F**at when others say you are too thin?
Would you say that **F**ood dominates your life?

* One point for every 'yes'. A score of two or more indicates a likely case of anorexia or bulimia nervosa

Table 4. Indicators of medical instability suggesting need for hospital admission

- Heart rate <50 bpm
- systolic BP <80 mmHg or diastolic BP <40 mmHg
- Postural BP drop >10 mmHg
- ECG demonstrates any abnormalities, particularly prolonged QTc interval
- Temperature <35.5°C
- Weight <75% predicted ideal body weight (BMI <15)
- Electrolyte disturbance (eg. hypokalaemia)

A summary of the physical findings in AN and BN is depicted in *Figure 1*.¹⁷

Investigation and monitoring

Repeated weights are best measured in minimal clothing and substantiated with measurement of urine specific gravity (SG) and pH. Urine SG can assist in detecting water loading or dehydration (SG <1.010 indicates significant water loading). An elevated pH (>8) is indicative of ongoing catabolism.

Electrocardiogram (ECG) may also demonstrate a prolonged corrected QT interval (QTc >450 msec), associated with potentially fatal arrhythmias and further evidence of medical compromise.⁴

Baseline blood results consistent with malnutrition include:

- alteration of electrolytes
- low protein and blood sugar levels
- elevated total cholesterol, transaminases and vitamin B12 level.

Other common findings are:

- leukopaemia, thrombocytopaenia and varying degrees of anaemia¹⁸
- high creatinine and urea despite low muscle mass, typically indicating dehydration
- elevated serum ferritin, consistent with contraction of the intravascular space and sequestration of iron from red cells into storage
- erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) levels are low,^{1,4,19} and aid in the exclusion of inflammatory causes of malnutrition
- the hypothalamic-pituitary-gonadal axis hormones are suppressed with low oestrogen (E2), lutenising hormone (LH) and follicle stimulating hormone (FSH) as part of the cascade of changes which follow a decrease in T3 (tri-iodothyronine) – a reflection of the body's attempt to conserve energy by reducing the basal metabolic rate⁴
- increased creatine phosphokinase (CPK) levels are indicative of strenuous physical activity (typically found in the exercising subtype of AN).

Management

General practitioners play an important role in the early detection and management of adolescents at risk of developing an eating disorder. Information about normal development, healthy eating and regular exercise may be all that is required to prevent progression to an eating disorder. Use of a food diary is helpful to identify any triggers for the disordered eating. Promoting a moderate exercise program (preferably that encourages socialisation as well, eg. netball versus solitary running) to adolescents

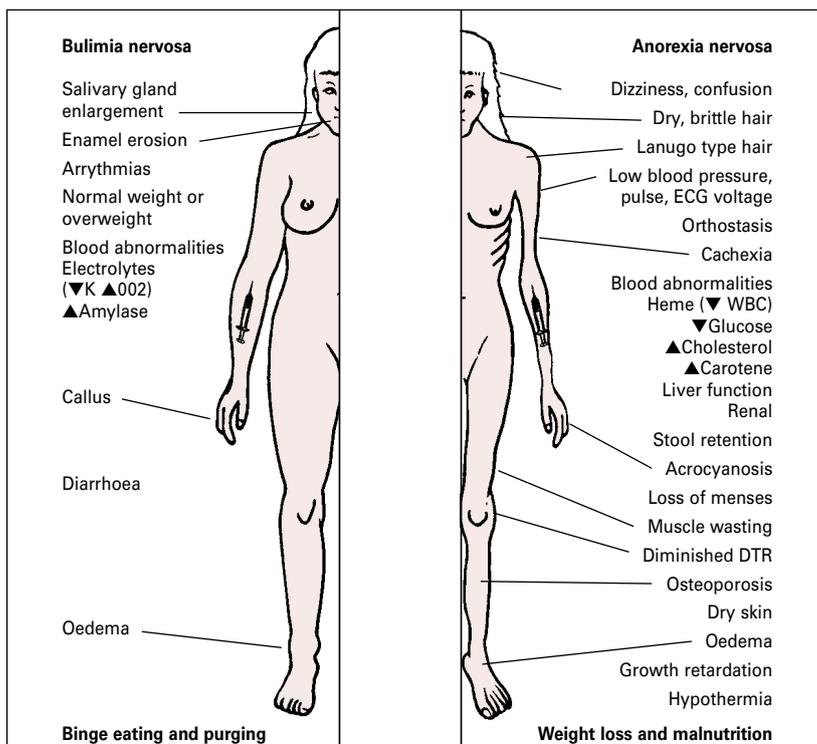


Figure 1. Physical findings in AN and BN

already engaging in dieting or weight control behaviours can also be beneficial.^{1,4} In those with an established eating disorder, the GP is often also responsible for coordinating referral to, and care by, consulting tertiary services and local dietetic and psychological services.

Successful professional intervention leads to containment of the unwanted behaviours and progression to health through replacement with adaptive coping strategies and healthy eating behaviours. It is optimal to gradually increase weight by 250–500 g/week to a minimum healthy weight, calculated by reference to the 50th centile for BMI (see *Resources*) or from measurement of body composition status which can be obtained from a body dual energy X-ray absorptiometry (DEXA) scan.

Failure to arrest the weight loss or gain any weight over 2–3 consecutive weekly reviews warrants referral to a multidisciplinary specialist service (see *Resources*). The inability to make any positive changes usually indicates the adolescent is precontemplative of change and is likely to require specialised management.

If the adolescent is noted to be medically compromised (*Table 4*), admission to hospital is recommended for medical stabilisation. This usually involves warming the adolescent to a temperature above 35.5°C, which is then maintained, and providing the adolescent with adequate fluids and calories via nasogastric tube feeding. Nutritional resuscitation can be rapidly and safely undertaken with this

regimen, adding concurrent oral phosphate supplements and multivitamins without occurrence of refeeding syndrome.²⁰ Ongoing treatment requires monitoring of weight, fluid status and electrolytes, with gradual increase of oral intake to about 3000 kcal/day. Patients are discharged to continue nutritional recovery at home on an outpatient basis when they are able to eat regular food in adequate amounts. Family based therapy has been demonstrated to offer the best support for young patients with AN following discharge from inpatient care, particularly when the duration of illness is less than 3 years.²

In BN, the mainstay of treatment is psychological as it revolves around behaviour modification to reverse the binge/purge pattern, and dietetic support to understand the energy balance and the importance of regular meals and physical activity in maintaining an ideal body weight by increasing one's metabolism. The main role of the GP in this instance, is periodic blood tests if there is ongoing vomiting, to ensure the serum electrolytes remain within normal limits.

For both AN and BN, adjunctive treatment with medication has been shown to improve clinical outcome, although the role of medication remains controversial. Selective serotonin reuptake inhibitors (SSRIs) are most useful for management of comorbid mood symptoms such as anxiety and obsessive compulsive routines.⁴ Olanzapine is increasingly being recognised as an effective strategy for the management of intrusive and perseverate eating disorder cognitions not contained through intensification of treatment or nutritional recovery.² However, olanzapine is not covered by the Pharmaceutical Benefits Scheme for this indication.

Once patients are referred to a specialist unit their progress is regularly communicated to the referring GP to enable a smooth transition back to community care. A number of tertiary programs are using or developing shared care programs with GPs to facilitate this process, particularly for rural patients. General practitioner involvement then involves ongoing monitoring of the adolescent's physical health and recovery, as well as coordination of interdisciplinary services supporting the young person and their family. In most cases, medical issues such as the resumption of menses and nutritional health take place before the adolescent achieves psychological recovery. That is, even after the recovery of physical health, an adolescent with AN is likely to have persisting cognitions of their eating disorder that may be reflected in persistent unusual eating behaviours.²

It is predictable that relapse is likely to occur at times of increased stress in the adolescent's life such as approaching final secondary school exams, or following a relationship break up. Primary care providers are best

placed to remain engaged with adolescents after recovery to enable prompt reassessment should patterns of eating disorder behaviour recur.

Summary of important points

- The overall prevalence of eating disorders among children and adolescents is rising – the younger age group are more likely to present with AN, while older adolescents can present with either AN or BN.
- GPs play a key role in recognising and offering early intervention in cases of incipient eating disorders or dieting behaviour.
- Eating disorders exist as part of a spectrum and GPs will encounter many adolescents that have an eating disorder that do not yet fulfil DSM-IV diagnostic criteria for either AN or BN.
- The physical findings of AN are those of protein calorie malnutrition, while in BN they reflect chronic purging.
- Failure of outpatient management requires hospitalisation for nutritional rehabilitation with close monitoring of fluid and electrolyte status to prevent the development of refeeding syndrome.
- Family involvement is vital, particularly in younger patients, with ongoing family therapy offering the best known outcomes.

Resources

- BMI calculators and curves are available from Centers for Disease Control and Prevention: www.cdc.gov/nchs/about/major/nhanes/growthcharts/datafiles.htm
- Eating Disorders Foundation Inc: www.edf.org.au
- Centre for Eating and Dieting Disorders has links to contact centres in each state, both private and public: www.ceed.org.au

Specialist units

Victoria

Victorian Centre of Excellence in Eating Disorders
8th Floor, CCB, Royal Melbourne Hospital
Grattan Street, Parkville Vic 3052
Telephone 03 9342 7507 Fax 03 9342 8216
Email ceed@mh.org.au www.ceed.org.au

New South Wales

The Eating Disorder Service at The Children's Hospital at Westmead provides telephone consultation for clinicians caring for adolescents under 16 years of age. Telephone 02 9845 0000
The Adolescent Medicine Service at Westmead Hospital provides similar support for school aged adolescents over 16 years of age. Telephone 02 9845 6788

Western Australia

Eating Disorders Program
Princess Margaret Hospital for Children
Roberts Road, Subiaco WA 6008
Telephone 08 9340 7012
www.pmh.health.wa.gov.au

Conflict of interest: none declared.

References

1. Wilhelm KA, Clarke SD. Eating disorders from a primary care perspective. In: MJA Practice essentials – Mental health. Sydney: Australasian Medical Publishing Company, 1998;71–6.
2. Hay P. Australian and New Zealand clinical practice guidelines for the treatment of anorexia nervosa. *Aust N Z J Psychiatry* 2004;38:659–70.
3. Miller KE, American Academy of Family Physicians. Treatment guidelines for eating disorders. *Am Fam Physician* 2000;62:July.
4. Kohn MR, Golden N. Eating disorders in children and adolescents: epidemiology, diagnosis and treatment. *Paediatr Drugs* 2001;3:91–9.
5. Kjelsas E, Bjornstrom C, Gotestam KG. Prevalence of eating disorders in female and male adolescents (14–15 years). *Eat Behav* 2004;5:13–25.
6. Cooke R, Sawyer S. Eating disorders in adolescence: an approach to diagnosis and management *Aust Fam Physician* 2004;33:27–31.
7. Reijonen JH, Prat HD, Patel DR, Greydanus DE. Eating disorders in the adolescent population: an overview. *J Adolesc Res* 2003;8:209–22.
8. Wakeling A. Epidemiology of anorexia nervosa. *Psychiatry Res* 1996;62:3–9.
9. Goldenring J, Rosen DS. Getting into adolescent heads: an essential update. *Contemp Pediatr* 2004;21:64–90.
10. Strober M, Freeman R, Morrell W. The long term course of severe anorexia nervosa in adolescents: survival analysis of recovery, relapse and outcome predictors over 10–15 years in a prospective study. *Int J Eat Disord* 1997;22:339–60.
11. Alexander N, Kohn M, Feeney K, Clarke S. The changing faces of anorexia nervosa. In: Bashir M, Bennett D, editors. *Deeper dimensions: culture, youth and mental health*. Sydney: Transcultural Health Centre, 2000;119–22.
12. Eating disorders. In: *Diagnostic and statistical manual of mental disorders*. 4th edn. Washington DC: The American Psychiatric Association, 1994; p. 539–50.
13. Rosen JC, Silberg NT, Gross J. Eating attitudes test and eating disorders inventory: norms for adolescent girls and boys. *J Consult Clin Psychol* 1988;56:305–8.
14. Mintz LB, O'Halloran MS. The eating attitudes test: validation with DSM-IV eating disorder criteria. *J Pers Assess* 2000;74:489–503.
15. Morgan JF, Reid F, Lacey H. The SCOFF questionnaire: assessment of a new screening tool for eating disorders. *BMJ* 1999;319:1467–8.
16. Muller EE, Locatelli V. Undernutrition and pituitary function: relevance to the pathophysiology of some neuroendocrine alterations of anorexia nervosa. *J Endocrinol* 1992;132:327–9.
17. Madden S, Kohn M. The Children's Hospital at Westmead Eating Disorders Treatment House. Staff handout 2007;Feb 15.
18. Amrein PC, Friedman R, Kosinski K, Ellman L. Hematologic changes in anorexia nervosa. *J Am Med Assoc* 1979;241:2190–1.
19. Palla B, Litt IF. Medical complications of eating disorders in adolescents. *Pediatrics* 1988;81:613–23.
20. Kohn M, Madden S. Letter. *J Paediatr Child Health* 2007;43:320.