Review of Clinical Research in Child and Adolescent Eating Disorders

Mae S. Sokol, MD, Tammy K. Jackson, MA, Curt T. Selser, BS, Holly A. Nice, Nicole D. Christiansen, BA, and Anna K. Carroll, BA

Abstract
Eating disorders (EDs) are common in children and adolescents and cause significant medical and psychological complications. This review covers the most recent research on EDs (excluding obesity) in children and adolescents 7–16 years of age. However, there are few studies and a lack of evidence-based treatment for eating disorders, especially with regard to psychological and psychopharmacological treatment, particularly in this age group. Adult literature is therefore presented when it is relevant to younger patients. Studies on epidemiology, etiology, medical and psychological complications, treatment, and prevention of EDs are included. Particular attention is paid to the fact that eating disorders are different in youngsters than in adults because children and adolescents are developmentally and cognitively different from adults. For example, starvation and dehydration lead to medical complications more quickly in children; adults need to be treated to decrease symptoms, but children also need to grow and develop; and development in children occurs during certain time frames, which if missed due to an eating disorder, can lead to permanent problems. Special issues involving over-the-counter substance use, males with eating disorders, diabetes, dieting, and athletes are also included.

Introduction
Recently, there has been much media attention surrounding childhood eating disorders (EDs). This has led to misconceptions that there is an “epidemic” of childhood EDs and that this is a new phenomenon occurring in younger and younger children. While this is not true, EDs are relatively common in this age group and can be serious. However, research on EDs in this age group is limited. It is difficult to study EDs in youngsters, as they do not fit adult classification systems for several reasons: there is a lack of standardized assessment tools and methods, different diagnostic criteria are used by different researchers, and the literature is inconsistent about the types of eating difficulties in youngsters and the terminology used to describe them.

There is uncertainty about how children with EDs differ from older adolescents and adults. Overvalued ideas about body image and weight are characteristic of EDs in adults. Many children with EDs are prepubertal and do not have adult intellectual capacity, making it difficult to know if they have these cognitive disturbances. Children with EDs are probably a heterogeneous group, some having these cognitive disturbances to varying degrees.

Focus Points
- Child and adolescent eating disorders are common and cause significant psychiatric and medical problems.
- Eating disorders in youngsters are different than in adults due to the developmental and cognitive differences between youths and adults.
- Treatment involves a multidisciplinary team working with patients along a continuum of care.
- Interventions include individual and family psychotherapy, nutritional rehabilitation, medical management, and medication.
- There are few studies and a lack of evidence-based interventions for eating disorders, especially in this age group; more research is clearly needed to better evaluate and treat child and adolescent patients.
Description of Eating Disorders in Young Children and Adolescents

Childhood EDs are characterized by excessive preoccupation with weight, body image, and/or eating, as well as inadequate, irregular, or chaotic eating not due to organic brain disease. Nicholls and colleagues evaluated the reliability of diagnostic classification systems for EDs in 7–16-year-olds. Results showed that the Great Ormond Street Criteria (GOS), developed specifically for this age group, were more reliable than criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). The GOS classification of childhood EDs include the following: (1) anorexia nervosa (AN), characterized by refusal to maintain minimally normal body weight (by food restriction, vomiting, overexercising, and/or laxative abuse) and abnormal cognitions about weight and/or body image; (2) bulimia nervosa, characterized by bingeing and purging, feeling out of control, and abnormal cognitions about weight and/or body image; (3) food avoidance emotional disorder, in which emotional disorder is the prominent feature, coupled with weight loss, mood problems without a primary mood disorder, and normal cognitions about weight and/or body image; (4) selective eating, characterized by food intake limited to a narrow range for ≥2 years, refusal of new foods, normal cognition about weight and/or body image, and frequently normal weight and height; (5) restrictive eating, characterized by eating small amounts, no mood problems, normal cognition about weight and/or body image, and usually low height and weight; (6) functional dysphagia, characterized by food avoidance; fear of swallowing, choking, or vomiting; and normal cognition about weight and/or body image; and (7) pervasive refusal syndrome, characterized by refusal to eat, drink, walk, talk, or care for self for several months, and resistance to assistance from others. It should be noted that depression may lead to decrease in appetite and eating problems, so it is important to distinguish depression from a primary ED, as treatment of these problems differs.

Children do not fit neatly into DSM-IV diagnoses. Using a classification system such as the GOS criteria to describe children’s eating disorders and disturbances would improve clinical work and future research.

Epidemiology

EDs affect approximately 5 million Americans each year. AN affects more than 1 million Americans at some point in their lifetime, with approximately 90% of these cases occurring in females. AN has the highest morbidity and mortality rate of any of the psychiatric disorders. Untreated, it may prematurely claim the lives of approximately 20% of those affected within 10 years. Whether or not AN has increased, the number of individuals seeking help has. Yet, the number of anorexics receiving treatment is far less than expected given its prevalence. In a 7.5-year follow-up study, only 33% of anorexics fully recovered, but 84% had a partial recovery; the recovery rate for bulimia nervosa was full in 74% and partial in 99% of treated patients.

Bulimia nervosa is about three times more common than AN, with the lifetime prevalence of bulimia nervosa in women approximately 1.3%10 (equivalent to approximately 1.8 million American women). Point prevalence rates for adolescents are approximately 0.5% for girls and 0.3% for boys, which is similar to adults.

Etiology

Biological Causes

EDs were traditionally considered psychological and cultural in origin. However, recent family, twin, and genetics research identify a strong genetic component in the etiology of these disorders. Twin and family studies demonstrate that predisposition to AN can be inherited. Recent research has investigated links between AN and structural differences in serotonin, monoamine, cannabinoid, and estrogen receptors, as well as neuronal potassium channels. Notably, candidate genes for AN have been found on chromosome 1 in an area that contains serotonin and opioid receptor genes.

Research on the genetics of bulimia nervosa is similar. Multiple twin studies comparing concordance rates estimate bulimia nervosa’s heritability at 60% to 62%. A susceptibility gene for bulimia nervosa was recently found on chromosome 10.

Infectious agents may cause neuropsychiatric disorders, including AN, obsessive-compulsive disorder (OCD), and tics. When the pathogen is group A β-hemolytic streptococcus, these disorders are called Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcus (PANDAS). Treatment of PANDAS AN requires further research.

Psychological Causes

Numerous etiological factors have been explored in EDs, including family dynamics and abuse in childhood, individual personality characteristics, such as perfectionism, and cultural factors, such as weight concerns and availability of food. Sexual abuse increases risk for psychopathology in general, including EDs. Also, ED patients with a sexual abuse history may be more likely to engage in self-injurious behaviors. Anorexia nervosa may be twice as likely to have a history of abuse than the general population.

Classically, AN has been associated with two types of family dynamics, enmeshed and distant. Studies suggest a relationship between AN and attachment problems. When AN patients were interviewed after 15 years, the most common perceived cause of illness (in 34.78% of subjects) was “dysfunctional families.”

Cultural Factors

The role of culture in child and adolescent EDs is relatively unknown. Traditionally, EDs were thought to be part of Western culture, occurring mainly in those of higher socioeconomic status (SES). Although most patients receiving ED treatment are of higher SES, community sample studies show that EDs occur in all SES groups and in different cultures.

Children are increasingly saturated with media ideals of body type and dieting information. Wanting to look like media figures led to increased physical activity in one adolescent study. In Fiji, a culture where eating disorders were once virtually nonexistent, a study of adolescent girls showed that disordered eating and weight concerns dramatically increased when television was recently introduced.

EDs are more common in white than black women, but the prevalence in other ethnic groups has not been adequately examined. Some groups of Hispanics may be at greater risk of developing EDs than others.

Medical Complications

Youngsters with EDs develop a number of acute and chronic medical complications in all organ systems. Starvation and dehydration cause cardiovascular...
problems, including dispersed QT interval. Fortunately, cardiac abnormalities usually resolve in referred adolescent anorexics. Malnutrition and refeeding can cause acute pancreatitis.

Decreased bone mineral density (BMD) is an important potential long-term problem in AN. A subject of some controversy has been the use of hormone replacement therapy. This treatment does not appear effective. Weight restoration in premenarchal girls with AN was frequently later followed by normalization of BMD, but also by failure to reach full height potential.

Psychological Complications

Youngsters with AN frequently have comorbid psychiatric disorders, including depression and anxiety disorders. In a 10-year follow-up study of adolescent anorexics, 92.3% had at least one other psychiatric disorder during their lifetime, and 51.3% had at least one concurrent with AN. OCD may be more common in youngsters than adults with AN. Adult anorexics make more suicide attempts than bulimics and the general population.

The majority of individuals with bulimia nervosa have at least one comorbid psychiatric disorder, most commonly a mood, anxiety, substance abuse, or personality disorder. Aggression is more common in adolescent girls who binge and purge.

Treatment

Treatment for EDs is mainly based on expert clinical opinion following guidelines published by several academic groups rather than evidence-based studies (Table). Immediate goals in the treatment of AN include weight restoration and reestablishment of normal eating, as well as evaluating and treating medical and psychological complications. Resolution of orthostatic hypotension may be a good indicator of medical stabilization. Resumption of menses requires restoration of hypothalamic-pituitary-ovarian function and usually occurs at 90% of average body weight, which may therefore be a reasonable goal weight for older adolescents.

Treatment of bulimia nervosa requires psychotherapy and nutritional counseling. Medication, such as the selective serotonin reuptake inhibitor (SSRI) fluoxetine, is a useful addition if these modalities are not sufficient.

Psychotherapy

There are many ED psychotherapy studies, but their results are difficult to evaluate because of inconsistencies in terminology, outcome time, concurrent treatment, and inclusion criteria. For AN, there are many clinical descriptions of psychotherapy, but the evidence base for treatment efficacy is weak for all age groups. The evidence for psychotherapy's efficacy in bulimia nervosa is much stronger; but there are no published controlled trials in children or adolescents.

Cognitive-behavioral therapy (CBT) is the most widely used and studied psychotherapy for eating disorders. There are only a few studies on CBT for adult anorexics that suggest that this therapy may improve outcome moderately. In bulimia nervosa, there are many randomized controlled trials showing efficacy of CBT, particularly when CBT focuses on changing abnormal eating behaviors and thoughts about weight and body image.

Interpersonal psychotherapy (IPT), which helps patients identify and decrease interpersonal difficulties that can lead to and maintain eating disorders, appears to be helpful in bulimia nervosa but has not been studied much in AN. Other forms of psychotherapy may be effective, including dialectical behavior therapy, supportive therapy, and psychodynamic psychotherapy.

Group therapy is another effective treatment, especially when combined with group meals, individual therapy, and long-term treatment. Patient education about nutrition and the dangers of EDs is important.

Given the limited evidence and few comparison trials on psychotherapy, especially in the younger age group, clinical choice of psychotherapeutic intervention should depend on a particular patient and family's needs, progress in treatment, and the clinician's knowledge base.

Family Therapy

Family therapy is essential for the treatment of EDs in youngsters. Family interventions mobilize family strengths and resources to help youngsters with eating disorders. These interventions include combined therapy with parents and child, separate sessions for parents and child, and parent counseling. The treatment outcome literature suggests that family-based interventions may show particular promise for youngsters, especially those with AN. Robin and colleagues found encouraging preliminary results with behavioral family systems therapy. Early studies of the Maudsley family psychotherapy model indicate success mainly in adolescent AN patients and possibly in bulimia nervosa. This treatment uses the family as a resource for recovery and puts the parents in charge of refeeding their child.

The promising results of family-based interventions for youngsters with eating disorders merit further exploration. These methods may be appropriate in outpatient treatment for patients who are making rapid progress and who do not need hospitalization for medical complications or comorbid psychiatric symptoms. Family therapy is also an important component of inpatient treatment, especially to improve communication and cooperation among family members, and to help transition the child back into the family after discharge from the hospital.

Pharmacologic Treatments

There are few controlled studies on the pharmacologic management of EDs in youngsters. Few medications carry the United States Food and Drug Administration indication for use in

---

**Table**

Differences in Clinical Treatment of Anorexia Nervosa and Bulimia Nervosa

<table>
<thead>
<tr>
<th>Setting</th>
<th>Anorexia Nervosa</th>
<th>Bulimia Nervosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>Weight gain</td>
<td>Psychotherapy</td>
</tr>
<tr>
<td></td>
<td>Psychotherapy</td>
<td>Nutritional counseling</td>
</tr>
<tr>
<td></td>
<td>SSRI (to prevent relapse after weight recovery)</td>
<td>Psychiatric medication</td>
</tr>
</tbody>
</table>

SSRIs: selective serotonin reuptake inhibitors.

children. For AN, SSRIs are not effective during refeeding but fluoxetine may help prevent relapse in weight-restored anorexics. Open trials indicate that neuroleptics may improve weight gain and decrease anxiety and delusional ideas about eating.

In bulimia nervosa, higher doses of SSRIs than those used for depression may be needed. Fluoxetine 60 mg/day appears effective in adolescents, but this medication is only FDA approved for adults. The FDA warns that SSRIs may increase suicidality in youngsters.

Ondansetron decreased bulimic behaviors in a controlled trial. Topiramate was effective for bulimic adults and adolescents in small studies. Possible adverse effects of topiramate include hyperthermia, especially in children, and weight loss. Case studies of psychostimulants show decreased bulimic behaviors. Despite efficacy in bulimia nervosa, bupropion is contraindicated in bulimia nervosa and AN because of seizure risk.

Prevention
An increase in knowledge about EDs does not necessarily lead to behavior changes. In fact, many youngsters report starting ED behaviors after learning about them in prevention programs. Parental involvement and focus on increased self-esteem instead of ED-specific education is recommended. Prevention programs may show better outcomes if targeted at high-risk groups.

Emerging Issues
Eating Disorder Not Otherwise Specified
Eating disorder not otherwise specified (EDNOS) is a diagnosis given when there are significant ED symptoms but criteria for AN and bulimia nervosa have not been met. Many youngsters seen in clinical settings and almost half the patients treated in specialty ED programs have EDNOS, yet there is almost no research on this diagnostic category. A study of 14-15-year-olds found a lifetime prevalence for EDNOS of 14.6% in girls and 5% in boys.

Binge-eating disorder (BED) consists of bingeing without compensatory behaviors used in bulimia nervosa, and often leads to overweight. In the DSM-IV, BED is classified under EDNOS and is considered worthy of further study. Proposed provisional criteria for BED in children differ from adult criteria. Children with BED are less likely to diet and are more concerned with feeling out of control than with fear of weight gain. Treatment similar to bulimia nervosa shows promise for adult BED: CBT and medication, including SSRIs or topiramate, may be promising.

EDNOS also includes many patients with EDs who exercise excessively. Chewing and spitting out food is another symptom commonly encountered in eating disorder patients, especially in youngsters, and those with greater psychopathology.

Over-the-Counter Substance Use in Eating Disorders
Numerous substances are utilized by individuals with EDs to reduce body weight, induce vomiting, increase caloric expenditure, and/or achieve fitness goals. Vomiting and diet pill abuse are more common than bingeing and laxative, diuretic, and ipecac misuse in adolescents. Female adolescents are more likely than males to abuse herbal weight loss supplements. Males more frequently use diuretics and creatine as diet aids and to build muscle.

Laxative use increases the risk for medical complications. Bulimics who abuse laxatives are more likely to have behavior problems. Laxatives, diet pills, and purging are associated with alcohol and cigarette use in middle school students.

Diet pills and herbal weight loss supplements are widely used and often unregulated. Most patients seeking treatment for bulimia nervosa admit to using diet pills. The FDA recently banned the sale of diet pills containing ephedra following reports of illness and death.

Males and Eating Disorders
Males with EDs are often misdiagnosed, but there has been heightened awareness of this problem recently. Young males with EDs often have poor self-esteem and strive for a more muscular shape, rather than decreased weight. They may suffer shame about having what is perceived as a “girl’s illness,” and therefore be less likely to disclose their problem. Bisexual and homosexual orientation may be risk factors, but EDs are present in individuals of all sexual orientations.

While the prevalence of EDs in males is less than in females, it is likely higher than previously reported. One study found the following lifetime prevalences in boys: 6.5% for any ED, 0.2% for AN, 0.4% for bulimia nervosa, and 0.9% for BED.

Eating Disorders and Type-1 Diabetes
Adolescents with type-1 diabetes mellitus are twice as likely to develop EDs as their peers. Intentional insulin omission is a common sign of an ED in type-1 diabetes adolescents. Young children with type-1 diabetes are more likely to restrict caloric intake and have hypoglycemic episodes, as parents monitor insulin use and may not know how much the child has actually eaten. Comorbid anorexia and type-1 diabetes is particularly dangerous, with mortality much higher than in either condition alone.

Dieting in Normal-Weight Children
Many 5-9-year-olds are dissatisfied with their bodies and restrict their food intake. Dieting is common, with 62.3% of adolescent girls and 40.5% of boys reporting dieting in the last year. Thirteen percent of adolescent girls and 7% of boys reported bingeing and purging. Those on diets were more likely to binge and purge. Clinicians are advised to refrain from advocating caloric restriction. Promoting healthy food choices, physical activity, and psychotherapy when needed is preferable.

Athletes
Sports often emphasize lean body appearance, which may increase the risk of developing an eating disorder in some athletes. As early as 5 years of age, girls who participated in aesthetic sports, such as figure skating, reported higher weight concerns than girls participating in nonaesthetic sports or no sports. There is higher incidence of AN in elite female athletes in sports in which thinness is emphasized, such as gymnastics, dance, and track. The “female athlete triad” consists of amenorrhea, osteoporosis, and disordered eating. Male elite athletes are also at a greater risk for developing AN. Female athletes who compete at lower levels have lower rates of AN and body dissatisfaction than elite athletes and those not involved in sports.
Levels of Care

A continuum of care with a multidisciplinary treatment team is optimal for ED treatment. This includes inpatient, day treatment, residential, and outpatient services. Early detection and intervention are critical for creating positive outcomes. Several studies suggest better outcomes with longer hospitalizations for AN. ED treatment is expensive and treatment resources are limited. Further research is needed to determine optimal, cost-effective treatments for these patients.

Conclusion

EDs have been described in children and young adolescents for a very long time, and it has become increasingly accepted that EDs exist in this age group. But childhood-onset EDs have not been well studied and there are no age-specific standardized assessment methods.

A growing body of research highlights important differences with adults. These children have maladaptive behaviors around food, although their underlying psychological issues are not clear and are different from adults. Children develop the effects of starvation and dehydration more quickly than adults, leading to more medical complications. In treatment, adults need to decrease symptoms, but children also need to grow and develop normally. Development can only occur during certain time frames, which if missed, can lead to permanent problems.

It is recommended that healthcare providers ask about ED symptoms and discuss healthy nutrition and exercise with all their patients, not just those who are underweight or overweight. Treatment involves psychiatric, nutritional, and medical interventions. It is essential to involve the whole family. There is a poor armamentarium of psychotropic medication for EDs. Medication is at best only a useful addition to the rest of treatment, particularly in youngsters.

Ongoing research will hopefully lead to a greater understanding of child and adolescent EDs. Research is particularly needed to determine better psychological and pharmacologic treatment, clarification of the costs and benefits of the different levels of care, and application of the limited evidence-based treatments for adults to children and adolescents.

References


