Chapter

Anorexia Nervosa

Fatima Elif Ergüney Okumuş

Abstract

Anorexia nervosa is characterized as having a significantly low body weight because of restricting energy intake or compensating to an excessive rate intentionally in order to attain or maintain an unrealistically thin ideal weight. Patients suffer multiple comorbid medical and psychiatric problems; moreover, deficits in treatment motivation are commonly seen, which causes a high rate of dropout from treatment programs. Thus, recent studies have focused on the etiology in order to develop efficient treatment options, as this can become a life-threatening problem. Prevention programs are also gaining attention, since full recovery can take a significant time and resources nevertheless may not be available for all cases. In this chapter, a brief history and basic diagnostic criteria of anorexia nervosa will be summarized. A review of comorbid psychiatric and medical conditions will be addressed. Prominent theories regarding its etiology and treatment options will be discussed in terms of a biopsychosocial approach. Finally, prevention studies will be highlighted.

Keywords: eating disorders, anorexia nervosa, body image, body dissatisfaction, compensatory behaviors, weight management strategies, dieting

1. Introduction

Weight management is essential for a healthy life, but in extreme cases, it can turn into a life-threatening condition. Eating behavior is an important dimension of weight management. For most of us, eating is an automatic response to hunger and can be as easy or normal as breathing. On the other hand, it may be a challenging area for people with eating disorders. Eating disorders (EDs) are serious psychiatric problems that have a multiple impact on health and well-being. The prominent types of EDs include anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). This chapter will focus on anorexia nervosa and start with a brief history of AN. In the following sections, basic diagnostic criteria and a review of comorbid psychiatric and medical conditions will be addressed. Throughout the text, we will discuss prominent theories regarding its etiology and treatment options from a biopsychosocial perspective. Finally, prevention studies will be highlighted.

Anorexia nervosa is a complex disorder that includes physiological, behavioral, cognitive, and emotional components. Historical traces of anorexia can be found in ancient times. A group of women who starved themselves for religious reasons in Rome in 383 was reported [1]. Fasting is a common ritual in many religions and cultures, although starving triggered by psychological factors as a weight management strategy can lead to serious medical problems. Cases similar to AN have been reported since the fourteenth century, but as a psychological problem, preliminary

cases were defined in 1873 and 1874 [2, 3]. The term anorexia nervosa means "nervous loss of appetite"; thus the early descriptions focused on food avoidance as the core problem. Then it was realized that people with AN do not suffer a loss of appetite; indeed their mind is extremely preoccupied with food. Hence, the psychological component became prominent, and the problem was conceptualized as a weight phobia and self-control. In fact, AN has been known about since the seventeenth century but was observed in the 1960s in western society and characterized as leading to a significantly low body weight because of restricting energy intake or compensating to an excessive rate intentionally, in order to attain or maintain an unrealistically thin ideal weight [4]. In the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*), the title Feeding and Eating Disorders covers problems related to eating behaviors and unhealthy strategies for weight management [5]. Feeding disorders include pica, rumination disorder, and avoidant/restrictive food intake and can usually be seen in children, resulting in malnutrition or delay in growth due to unhealthy feeding behaviors. On the other hand, EDs are mostly seen in teenagers and adults. Their onset usually falls during puberty when body changes gain importance. DSM-5 defines three types of EDs, AN, BN, and BED. The underlying psychological mechanism is similar between these types as an intense fear of gaining weight and preoccupation with weight, body, and eating that leads to weight management strategies also known as compensatory behaviors like dieting, exercise, self-induced vomiting, misuse of laxatives, and diuretics [6]. The subtypes of EDs differ in body weight and weight management strategies. BN, BED, and other problems related to eating are beyond the scope of this chapter. Thus, we will first take a closer look at the clinical presentation of anorexia nervosa.

2. Clinical presentation

The current definition and clinical presentation of anorexia nervosa is determined by DSM-5 [5]. According to this diagnostic criterion, AN involves the following factors: The first criterion is a refusal to maintain a normal body weight despite being underweight. The factor of underweight or significantly low weight is usually determined by a body mass index (BMI) lower than 18.5 [7]. Nevertheless, not every underweight person is considered to have AN, though in this case being underweight is extremely important and in order to maintain this situation or to lose more weight, compensatory behaviors are evident. These unhealthy weight management strategies include excessive dieting or exercise, self-induced vomiting, and misuse of laxatives and diuretics, which leads to serious health problems including amenorrhea. The absence of at least three consecutive menstrual cycles was a diagnostic criterion for AN in the previous editions of the DSM [8]. Yet some women may have their periods even when they are underweight or there can be other metabolic problems resulting in amenorrhea. Moreover, it was making diagnoses difficult in men. In DSM-5, this original amenorrhea criterion was left out, in order to cover more cases.

Secondly, there is an intense fear of gaining weight or becoming fat, even though the body weight is less than normal. This fear is one of the most important factors that maintain compensatory behaviors and may not change despite weight loss. The third criterion is a disturbance in body image. Body image is a multidimensional framework that contains perceptions, attitudes, cognitions, emotions, and behaviors related to the body [9]. It can be defined as a representation of body in mind and is presumed to be the core psychological problem in AN [10]. People with AN have a body image distortion, resulting in a feeling of fatness independent of their

weight; also negative attitudes towards the body, including body dissatisfaction, are prevalent [11]. Behaviors related with body such as excess weighing, body checking, and avoiding tight clothes might take up a lot of time on a daily basis. Negative body attitudes or body dissatisfaction has become almost a cultural norm in this age, especially for women, but for AN sufferers, these disturbances in body image are multifaceted and time-consuming, and this decreases functionality; also self-evaluation is mostly influenced by body shape and weight [12].

In AN diagnosis, two types were specified: restricting type and binge eating/purging type. Excessive dieting is prominent in the restricting type, whereas binge eating/purging type is characterized by recurrent binge eating episodes following by purging as a compensative behavior. A common definition for a binge eating episode is eating in a certain (e.g., at least 2 h) period of time an amount of food that is larger than most people would eat in a similar time period or condition accompanied by a sense of lack of control over eating (feeling that one cannot stop eating). Most commonly, self-induced vomiting or excessive dieting/exercise as purging behaviors follows this type of episode. The subtypes of AN are helpful in defining the clinical presentation of cases, but it should be noted that the predictive validity is weak, as transition between subtypes (both in AN and between AN and BN) is quite common [13]. The difference between the binge eating/purging type of AN and BN is that the AN cases are underweight. Also in AN, binge eating episodes might be subjective and may not always meet a clinical definition. However, there is also evidence that impulsivity, self-harming, social withdrawal, and comorbid psychiatric problems are more common in the binge eating/purging type, whereas perfectionism is more common in the restricting type [14]. Another problem in clinical presentation is that in most cases there is a lack of insight regarding their problem and deficits in treatment motivation are prevalent [15].

3. Comorbid medical and psychiatric conditions

Patients suffer multiple comorbid medical and psychiatric problems, as eating behavior affects health in multiple ways directly or indirectly [16].

Almost every system in the body is affected in AN, including gastrointestinal, cardiovascular, skeletal, nervous, endocrinological, and reproductive [17]. Physical examination results usually show low blood pressure, bradycardia, low body temperature, gastrointestinal problems, dehydration, hormonal deficits, amenorrhea or other menstrual problems, hair loss, and lanugo hair [18]. Cardiovascular problems include irregular heartbeats, heart attacks, and collapse of heart valves and may cause death [19]. Starvation affects menstrual functioning, resulting in poor reproductive health, with infertility problems. Even if anorexic women become pregnant, there is a high possibility of having small babies with complications or unhealthy children [20]. Self-induced vomiting may cause tooth erosion or calluses on hands [21]. AN usually begins at puberty, and this is an important time for the development of bones. Malnutrition can cause stunted growth and osteoporosis in the long term [22]. Anorexia is also associated with changes in the nervous system like loss of grey matter in the brain and reduction in pituitary size, resulting in deficits in attention, learning, memory, and visuospatial analyses [23, 24]. Above all, anorexia has the highest mortality rates among psychiatric disorders [25]. All of these medical problems can cause heart attacks or infections, but suicide is the most common cause of death [26].

In addition to physical problems, psychological complications are prevalent in AN. Almost half of the cases have a comorbid DSM diagnosis, especially depression

being the most common among them [27]. Problems related to anxiety like social phobia and obsessive-compulsive disorders are highly associated with anorexia [28]. Trauma-related problems are more prevalent in the binge eating/purging type [29]. Comorbid psychological problems have a negative impact on prognosis and predicted suicide attempts [30]. As a result, AN is a chronic condition accompanied with a range of physical and psychological problems that interfere with daily functioning, and it has a high mortality rate.

4. Prognosis

Prognosis of anorexia is difficult, and full recovery is only possible in almost half of the cases [31]. Even when the physical symptoms are treated and the weight is maintained within the normal ranges, cognitive, emotional, and behavioral aspects of anorexia might continue. A complete recovery is only possible when all the symptoms are gone and especially when a positive body image is developed [10]. For this reason, recovery is considered as a long process that may take several years. Recurrent episodes of relapse are prevalent and accepted as within the nature of the disorder. Moreover, deficits in treatment motivation are quiet common, which causes a high rate of dropouts and chronicity of the problem [15]. Several factors may affect prognosis. For example, a very low BMI and a prolonged time before applying for treatment may worsen the process of prognosis [32]. Therefore, early detection and providing evidence-based treatment approaches are crucial to the course of anorexia.

5. Epidemiology

Estimating the prevalence of anorexia nervosa is problematic because it is a rare problem. The course of illness is variable, and sufferers are usually reluctant to report their situation or take part in studies [33]. Lifetime prevalence of DSM-5 diagnosis of AN in the West varies between 1 and 4% [27], but it has also been recently increasing in the non-Western world such as in Asia and the Middle East [34]. The problem is that most cases do not meet the full diagnostic criteria; resulting subthreshold EDs are more common in at-risk populations like high school and college samples [35]. Anorexia nervosa diagnosis is the most sexually based psychiatric problem, and the stereotypical patient is usually considered to be a young, white female from a higher socioeconomic class. This stereotype is not true all the time. However, the vast majority of the cases are women and the current male-female ratio is standing at 1:10 [5]. Nevertheless, recent studies show that between 3 and 20% of AN cases are male [36, 37]. Underdiagnoses of AN in men are a result of several factors that include sociocultural expectations towards women and the difference in symptom presentation in men. The mean age of onset is 17 in AN and the risk decreases with age [38]. However, onset of the disorder can be after age 40 or even later in some cases [39]. AN has been found to be less common among Black than White Americans [40], possibly due to underrepresentation in specialist eating disorder services and under detection in primary care [41]. Other than that, there is no systematic association between ethnicity/race or socioeconomic status and eating disorder occurrence [42]. Being in a sexual minority is a risk factor for EDs which is general for both women and men [43, 44]. In conclusion, it is noted that anorexia can affect people of all ages, genders, races, ethnic origins, socioeconomic status, and sexual orientations [45].

6. Etiology

Several theories have been proposed to understand the etiology of AN. Although these theories will be presented individually, it is recognized that a multidimensional approach is helpful to understand the causes of AN, even though such a comprehensive model has not yet been developed. Biological, psychological, and social factors interact with each other in the etiology. Prominent models include the genetic and neurobiological model, the psychodynamic model, the sociocultural model, and the cognitive behavioral model. Significant life events, personality, and a family system approach are also productive in understanding the causes of anorexia.

6.1 Genetic explanations

Genetic explanations focus on the biological mechanisms behind AN. Family, twin, and genetic studies found that AN runs in families [46]. A family history of AN puts people fourfold more at risk and relatives of women diagnosed with AN are 11 times more at risk of developing AN than controls [47, 48]. Moreover there is strong evidence that all types of EDs (AN, BN, and not otherwise specified EDs) track together in families without specificity [48]. Twin studies also show a genetic heredity for AN of between 28 and 74% but fail to identify specific genes [49]. In addition to these, anorexia interacts with other psychiatric problems. For example, people with a diagnosis of AN have a higher risk of developing OCD or vice versa [50]. Thus, genetic factors are considered responsible for 48–74% of the total variance in liability to AN [46]. Nevertheless, genetic factors cannot alone predict who will develop AN, as most of the cases do not have a familial history of EDs. Furthermore, methodological problems due to small sample size also reduce the likelihood of repetition of these studies.

It is evident that genes play an important role in the development of AN, although how these genetic predispositions interact with environmental factors has been a focus of research lately. Candidate gene and genome-wide studies are considered helpful in finding the answers. Research on candidate genes examined the serotonergic system (5-HT system), dopaminergic system, and opioidergic system that affect appetite, reward mechanism, mood, and weight; nevertheless, statistically significant results have not been presented so far [51]. Genome wide studies showed a relation between chromosomes 1, 11, and 12 and genes related to leptin regulation, lipid and glucose metabolism, serotonin receptor activities, and the immune system [52–55]. This genetic presentation is also consistent with the clinical presentation of anorexia. Further studies in these areas can be productive in order to explain the roles of genes in the AN etiology.

6.2 Neurobiological explanations

Neurobiological studies of AN focus on the brain areas, biological origins of symptoms, and neurochemical differences between people diagnosed with AN and healthy controls. Severe weight loss in anorexia causes a decrease in gray matter in several areas of the brain [56]. Moreover, a review of neuroimaging studies (PET, MRI, and fMRI) noted dysfunction in certain brain areas such as the amygdala, basal ganglia structures, and hippocampus [57]. On the other hand, research indicates dysfunctions in dopaminergic and serotonergic (5-HT) systems that are responsible for food, motivation, the reward system, executive function, emotion regulation, and impulse control [58]. Thus, food as a natural reward becomes a

source of both threat and anxiety, which makes it easier to avoid or restrict [59]. Neuroimaging studies also support this explanation. In one fMRI study with AN patients, an increase in amygdala activity (threat perception) and a decrease in inferior parietal lobe activity (food-related pleasure and interest) were evident while patients were looking at food pictures [60]. Furthermore, AN patients give different responses to body-related words and pictures than controls. They pay more attention to these words and pictures, focusing on the parts of the body rather than focusing on the body as a whole; they experience cognitive, perceptual, and emotional changes when they look at their own body [61, 62]. These changes can be explained through the decrease in occipital and prefrontal cortex activity.

Lastly, the "insula hypothesis" is proposed as a neurological model of anorexia nervosa that states that a dysfunction of the neural circuitry integrated by the insula can be responsible for the clinical presentation of AN [63, 64]. Symptoms arise because of disability in the insula, which establish a homeostatic balance by linking the brain's perception, emotional response, and memory-related regions to each other. Thus, it is assumed that this dysfunction causes changes in reactions to foods, internal and external bodily sensations, and emotional processing.

6.3 Psychodynamic explanations

Psychodynamic explanations usually offer a unique way to understand patients' experiences of AN. These models emphasize the meanings and functions of symptoms and early childhood experiences that may cause fixation or unconscious conflicts related to individualization, separation, dependency, and control. From a psychoanalytic perspective, restriction of food symbolizes an area of control and a denial of growing up or becoming a woman [65]. Thus, the patient can stay as a child and can be looked after. Furthermore, family dynamics play an important role in these psychodynamic models. Excessive involvement, rigidity, inability to resolve conflict, and excessive protectionism are common dynamics in families of AN sufferers [66]. Bruch [67] also stated that this overinvolvement by "perfect" mothers may cause ineffectiveness in the child, resulting in these children may be not being able to identify and understand their needs or internal states. When food becomes a way of self-soothing, relaxing, and communicating, this pattern may result in eating related symptoms. Nevertheless, psychodynamic explanations are important to understand patients as individuals. However, generalization and causality is always a problem within these explanations. Moreover, these models fail to explain why childhood relationships are expressed through eating behaviors. In addition, it is always difficult to test or evaluate these explanations.

6.4 Cognitive behavioral explanations

Behavioral models of anorexia nervosa regard the disorder as a behavior that has been learned and is maintained through reinforcement. Individuals reduce their food intake as a means to lose weight due to the social pressure to be thin or other experiences, and this behavior is reinforced by sociocultural norms, feelings of being in control. These first explanations were criticized for not focusing on causal factors, and therefore cognitive explanations were proposed to be linked with these behaviors. Slade [68] pointed out that interpersonal problems and family conflicts underlie the perfectionistic tendency in anorexia, and this tendency is a triggering factor for dieting. Cognitive explanations focus on patients' thoughts about food, eating, weight, and shape which parallel Beck's model on depression [69]. Moreover, predisposing factors for self-starvation such as perfectionism, self-criticizing, and control were specified [70]. Thus, once the dieting and weight loss begin, they are

reinforced and maintained easily as they become a way of gaining self-esteem. With the evidence-based studies, cognitive behavioral therapy (CBT) becomes the leading approach in both understanding and treating EDs in general [71]. CBT explains the etiology in AN as follows: dysfunctional thoughts of weight shape and body are influential in the development and persistence of symptoms, while weight control or compensatory methods (dieting, exercise, etc.) continue to reinforce the disorder. Symptoms are also conceptualized as a coping mechanism and a way of emotion regulation. Lately, Fairburn [6] has developed a transdiagnostic model of EDs that conceptualizes EDs beyond the diagnostic categories and targets the mechanism that is sustainable in all eating disorders. From Fairburn's transdiagnostic perspective, AN, BN, BED, and ED-NOS share the same core pathology that is cognitive in nature. For patients, the overvaluation of body shape and weight and their control is the most important part of life that defines and determines the worth of one's self. This pathology both causes and maintains eating and compensatory behaviors. In the case of anorexia, the consequences of malnutrition and hunger affect the cognitive ability of patients, which also causes rigidity in thoughts and behaviors.

6.5 Sociocultural explanations

Sociocultural models focus on the impact of culture and environment on body image and emphasize the importance of body image problems in the development of AN. Cultural expectations of thinness, usually termed "thin idealization," come from the media, family, friends, and peers [72]. Thinness is generalized within the scope of many positive meanings such as beauty, desirability, success, will, appreciation, charm, and control. Notably, exposure to images represented in the media that are often biologically unreachable for many women or even unreal (e.g., photoshopped) suggests thinness as a route to happiness, love, and success. Sociocultural models emphasize that the ideals of thinness are internalized through messages given by society, the media, peers, and family, resulting in eating and body problems and psychological symptoms in people who are dissatisfied with their body [73]. Lately, social media applications like Instagram and Tumblr and their impact on eating and body problems have become the focus of research in this area. Internalization of this thin ideal and an increase in body dissatisfaction are correlated with the prevalent pictures and the following of the accounts of thin people, celebrities, models, and actors [74]. Consequently, sociocultural factors play an important role in the thin idealization, but it is assumed that anorexia nervosa is developed through many factors including biological, cognitive, emotional, and social ones.

6.6 Risk factors in etiology

Several risk factors that include body dissatisfaction, dieting, being involved in body-related activities/sports/professions (dancing, ballet, athletics, modelling, acting, etc.), personality traits, family dynamics, and stress/trauma are stated as contributing to the etiology of anorexia [75]. Personality traits such as perfectionism, an obsessive-compulsive personality, and deficits in emotion regulation are prevalent in AN [76, 77]. These personality dimensions can be considered as both the predisposing and maintaining factors. Besides family dynamics, as we reviewed in the psychoanalytic model, are also important. Insecure attachment styles through stressful early childhood experiences and food-/body-related communications [78, 79] are the prominent factors related to the family. There is also some evidence of decreased family functioning in families of AN patients; however this might be a

result of having an anorexic family member, as EDs affect families and caregivers [45]. Finally a wide range of traumatic experiences are prevalent in patients with AN. These include childhood neglect, every form of childhood abuse, witnessing violence, rape, loss of significant others, accidents, as well as interpersonal stress like bullying, humiliation, and body-related teasing [80]. The abovementioned factors may have neurodevelopmental effects on the HPA pathway and serotonergic system, which play a role in the brain's response to stress [81].

7. Treatment

Evidence-based research in this area suggests promising results in treatment. At the same time, the treatment processes are reported to be long and especially expensive, almost like schizophrenia, yet full recovery is only possible for half of the patients [82]. A multidimensional treatment with a multidisciplinary team is necessary in AN treatment, as the disorder contains biopsychosocial elements in nature. Medical nutritional therapy for weight gain and nutritional counseling is important, especially in the case of severe weight loss. Pharmacotherapy has a limited role in the treatment and however can be beneficial in some cases. Nevertheless, there is certain evidence that psychotherapy is essential in AN treatment, although a multidisciplinary approach is required that includes nutritional therapy and psychiatric and medical evaluation as well [83]. Inpatient treatment is suggested in cases with a low BMI (<13.5), rapid decrease in weight, risk of suicide, social isolation, failure of outpatient treatment, and medical risk factors (e.g., cardiac problems and lowered blood sugars) [84]. Specialized units and clinics are also required for AN treatment.

7.1 Medical nutritional therapy

Medical nutritional therapy is an essential part of treatment in AN, especially for inpatients. This form of therapy focuses on the evaluation of nutritional problems and risks, and after that nutritional counseling is provided to treat the nutritional disorder and to prepare the patient for the next stages of treatment. In medical nutritional therapy, the first choice is oral feeding (chewing and swallowing), but enteral/tube feeding (giving liquid food to the stomach or intestine) or, as a last resort, parenteral feeding (bypassing the digestive process) is also applicable [5, 83]. Refusals against weight gain are common in these treatments; the nutritional therapist also provides counseling to patients. In severely underweight patients, feeding may cause refeeding syndrome. Although weight gain is the first goal, weight maintenance is the ultimate goal in the long term. Hence, nutritional therapy has a value in the whole treatment process.

7.2 Pharmacotherapy

Research has focused on the impact of several pharmacological agents on anorexia, as neurobiological factors are important in the etiology. Even so, antipsychotics and antidepressants have only a limited role in treatment [85]. However, there is some evidence about olanzapine, an atypical antipsychotic, whose mechanism of action is unclear, which is thought to block serotonin and dopamine, which may be effective in weight gain [86]. In addition, appetite regulators (e.g., dronabinol) and hormone (e.g., estrogen) drugs may contribute to both weight gain and anxiety reduction [87]. In the treatment of AN, antidepressants do not provide

the desired level of benefit, and it is suggested that this may be due to decreased 5-HT1A receptor activity, which is a consequence of starvation [88]. Nevertheless, almost half of the AN cases report using psychotropic medications despite lack of evidence supporting their efficacy, which is also concerning due to their severe side effects [89].

7.3 Psychotherapy

Psychotherapy is essential in anorexia treatment, and there is a range of psychotherapeutic approaches. The first psychological explanations of AN came from psychodynamic models, although psychodynamic treatments still have only limited effects [66]. Family therapy is the evidence-based psychotherapy type for younger AN patients, and some modifications are offered for adult patients [90]. CBT is the first step of treatment in BN and BED, and it also works for AN to some degree [91]. Other approaches include third wave behavioral therapies and eye movement desensitization and reprocessing (EMDR) therapy, which also show limited evidence of success in treatment.

7.3.1 Family-based approaches

Family dynamics are an important factor in the etiology of AN. The first studies in this area suggested family characteristics such as overinvolvement or inability to solve conflicts; however, family-based approaches put families as part of the solution, not the source of the problem. These approaches originated from the Maudsley Hospital in London and focused on the family system as a whole. Several randomized control trials proved the efficacy of family-based treatments in adolescents with AN [92]. At a basic level, this kind of therapy analyzes predisposing and maintaining family dynamics of anorexia and then plans the treatment procedure accordingly. A three-step treatment plan is conducted that is almost a yearlong [93]. The first level focuses on families' parenting skills and whether decisions related to eating are under family control. They learn how to help their child to gain weight. The aim of the second level is to empower patients to gain control over their eating behaviors when they reach the normal weight range. Finally, the last level focuses on individualization and developing healthy social relations both between parent and child but also in peer relations too. Behavior change is central to this model. A family-based approach is also proposed for adult patients. The Maudsley Model of Anorexia Nervosa Treatment for Adults (MANTRA) involves caregivers in both formulation and administration during the treatment process [94]. This motivational and client-oriented cognitive interpersonal model is developed specifically for AN patients. It focuses on eating related problems and symptoms but also obsessive and anxious-avoidant personality traits that are central to the maintenance of AN.

7.3.2 Cognitive behavioral therapy

Cognitive behavioral therapy is the leading empirically supported treatment for BN and BED, but also there is evidence of its effectiveness in AN [83]. Enhanced CBT (CBT-E) is based on the transdiagnostic theory and is designed to treat eating psychopathology rather than being a DSM eating disorders diagnosis [6]. The word "enhanced" refers to new strategies and procedures to improve treatment outcomes and test the model in different groups (e.g., in patients, day-patients, adults, adolescents, etc.). CBT-E can also be conducted in a multistep approach (outpatient,

intensive outpatient, and inpatient) by a multidisciplinary team according to the patient's needs. This intervention focuses on understanding the eating disorder mindset and its function. It is assumed that a change in the ED mindset will lead to symptom reduction. A standard CBT-E is a four-stage model. The first stage of treatment is aimed at creating a therapeutic alliance with assessment and case formulation. Regulation of eating behavior is the primary goal of this stage, through behavioral change. Patients are required to use self-monitoring sheets regarding their eating, and every session starts with a review of these records and in session weighing. The second stage (traditional CBT does not have this stage) is an overview and determination stage for possible barriers to change. Preoccupation with food and body is the main theme of the third stage. In addition, interpersonal problems, body checking behaviors, emotion regulation, ED mindset, and other individual factors related to the symptoms are central areas to work on. The last stage is focused on symptom prevention and possible future problems. Many cognitive and behavioral techniques including cognitive restructuring, exposure, and problem-solving training are used during this therapy.

Research indicates promising results regarding the efficacy of CBT-based interventions [95], especially on symptom prevention [91]. Thus, it is concluded that CBT-E is a cost-effective alternative to family-based treatments of anorexia [96].

7.3.3 Other psychotherapy approaches

Benefits of family-based interventions for adolescents are evident, and these approaches and CBT also work for adult cases to some degree although not for all. For these reasons the effect of different psychotherapies has gained attention. Research points to the effectiveness of psychodynamic therapy [97], third wave therapies (schema therapy, acceptance-commitment therapy, mindfulness-based interventions) [98], dialectical behavioral therapy [99], and EMDR [100], but no specific approach has shown clear superiority. Adding motivational techniques are also helpful [101], as deficits in treatment motivation are common among patients with AN. These findings suggest that a combination of nutritional therapy and anorexia nervosa-specific psychotherapy is an effective way to treat AN.

8. Prevention strategies

As mentioned above, AN is difficult to treat, as treatment might take a long time with high costs and may still not be possible in some cases. This has highlighted the importance of preventive studies. Prevention of EDs in general rather than AN-specific prevention is more common in research, since interchange between diagnoses and subthreshold EDs is more prevalent. Prevention strategies mainly work on two dimensions: first by reducing risk factors and second by targeting at-risk populations. Risk factors include thin idealization as a sociocultural element; dieting or excessive exercise as behavioral risk factors; and perfectionism, body dissatisfaction, and problems in emotion regulation as cognitive-emotional risk factors. These are more prevalent in high school and college samples as they constitute risky populations. Prevention programs can be school-based, computer-based, CBT-focused, media-literacy-focused, or on a sociopolitical level. A review of the details and effectiveness of these programs is beyond the scope of this chapter. However, longitudinal, structured programs have proven beneficial in reducing body dissatisfaction, disordered eating, and weight management behaviors [102]. Thus, adding preventive strategies to education and health systems can be a promising way of dealing with AN.

9. Conclusion

Anorexia nervosa is a complex psychiatric condition that is accompanied with a high morbidity and mortality risk. It is a rare problem and detection of cases with anorexia is hard as clinical presentation may vary; also voluntary admission to treatment facilities is low. Biological, psychological, and social factors intertwine in the etiology. Recent studies provide evidence of advances in understanding the psychobiological mechanisms that contribute to and maintain anorexia nervosa. Predisposing factors include genetic susceptibility and stressful early childhood experiences. On the other hand, psychological and social factors usually play a triggering role in the onset of symptoms. They also maintain the problem with changes in neural networks. Treatment of anorexia is a long and challenging process for patients, caregivers, and health professionals. Symptoms can become chronic when the necessary treatment is not provided. Even with the best treatment options, a full recovery is not possible in all cases. A multidimensional treatment provided by a multidisciplinary team in a specialized unit is fundamental for efficient treatment outcomes. Inpatient treatment can be required in severe cases. Nutritional therapy is an important part of treatment. Psychopharmacotherapy, on the other hand, has only a limited effect. Thus, psychotherapy is the leading factor in treatment. Evidence-based research indicates that adolescent patients with anorexia nervosa benefit from family-based interventions. Adults with anorexia nervosa have a good chance of achieving recovery or at least a substantial improvement in symptoms. CBT is an alternative to family-based interventions. Alongside these, a range of other anorexia-specific psychotherapy approaches is presented, although none of them has shown a clear superiority so far. This brings us to the importance of preventive studies regarding unhealthy eating and weight management behaviors. Future research will continue to focus on enhancing our understanding of the underlying biopsychosocial factors, in order to improve treatment and prevention.

Author details

Fatima Elif Ergüney Okumuş
Department of Psychology, Istanbul Sabahattin Zaim University, Istanbul, Turkey

*Address all correspondence to: elif.okumus@izu.edu.tr

References

[1] Pearce JMS. Origins of anorexia nervosa. European Neurology. 2004;**52**(4):191-192. DOI: 10.1159/000082033

[2] Gull WW. Anorexia nervosa. Practical Comprehensive Treatment of Anorexia Nervosa. 1985;**7**:22-28

[3] Lasègue EC. De l'anorexie hystérique. Archives Générales de Médicines. 1873;**1**:385-403

[4] Bruch H. Anorexia nervosa: Therapy and theory. The American Journal of Psychiatry. 1982;**139**(12):1531-1538. DOI: 10.1176/ajp.139.12.1531

[5] American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders (DSM-5®). Arlington: American Psychiatric Pub; 2013

[6] Fairburn CG. Cognitive Behavior Therapy and Eating Disorders. New York, USA: Guilford Press; 2008

[7] WHO. ICD-10: The ICD-10 Classification of Mental and Behavioural Disorders: Diagnostic Criteria for Research. Geneva, Switzerland: WHO; 1993

[8] American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed., text rev. Washington, DC: Author; 2000

[9] Slade PD. What is body image? Behaviour Research and Therapy. 1994;**32**(5):497-502. DOI: 10.1016/0005-7967(94)90136-8

[10] Bruch H. Perceptual and conceptual disturbances in anorexia nervosa. Psychosomatic Medicine. 1962;**24**(2):187-194. DOI: 10.1.1.320.7064

[11] Cash TF, Deagle EA III. The nature and extent of body-image disturbances in anorexia nervosa and bulimia nervosa: A meta-analysis. International Journal of Eating Disorders. 1997;**22**(2):107-126. DOI: 10.1002/(SICI)1098-108X(199709)22:2<107::AID-EAT1>3.0.CO;2-J

[12] Smolak L, Levine MP. Adolescent transitions and the development of eating problems. In: Smolak L, Levine MP, Striegel-Moore R, editors. The Developmental Psychopathology of Eating Disorders: Implications for Research, Prevention, and Treatment. New Jersey: Erlbaum; 1996. pp. 207-233

[13] Eddy KT, Dorer DJ, Franko DL, Tahilani K, Thompson-Brenner H, Herzog DB. Diagnostic crossover in anorexia nervosa and bulimia nervosa: Implications for DSM-V. American Journal of Psychiatry. 2008;**165**(2):245-250. DOI: 10.1176/appi.ajp.2007.07060951

[14] Peat C, Mitchell JE, Hoek HW, Wonderlich SA. Validity and utility of subtyping anorexia nervosa. International Journal of Eating Disorders. 2009;**42**(7):590-594. DOI: 10.1002/eat.20717

[15] Abbate-Daga G, Amianto F, Delsedime N, De-Bacco C, Fassino S. Resistance to treatment and change in anorexia nervosa: A clinical overview. BMC Psychiatry. 2013;**13**(1):294. DOI: 10.1186/1471-244X-13-294

[16] Brambilla F, Monteleone P. Physical complications and physiological aberrations in eating disorders. Eating Disorders. 2003;**6**:139-222. DOI: 10.1002/0470867183.ch3

[17] Mehler PS, Blalock DV, Walden K, Kaur S, McBride J, Walsh K, et al. Medical findings in 1,026 consecutive adult inpatient–residential eating disordered patients. International Journal of Eating Disorders. 2018;**51**(4):305-313. DOI: 10.1002/eat.22830

[18] Brown C, Mehler PS. Medical complications of anorexia nervosa and their treatments: An update on some critical aspects. Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity. 2015;**20**(4):419-425. DOI: 10.1007/s40519-015-0202-3

[19] Westmoreland P, Krantz MJ, Mehler PS. Medical complications of anorexia nervosa and bulimia. The American Journal of Medicine. 2016;**129**(1):30-37. DOI: 10.1016/j.amjmed.2015.06.031

[20] Linna MS, Raevuori A, Haukka J, Suvisaari JM, Suokas JT, Gissler M. Reproductive health outcomes in eating disorders. International Journal of Eating Disorders. 2013;**46**(8):826-833. DOI: 10.1002/eat.22179

[21] Romanos GE, Javed F, Romanos EB, Williams RC. Oro-facial manifestations in patients with eating disorders. Appetite. 2012;**59**:499-504. DOI: 10.1016/j.appet.2012.06.016

[22] Ecklund K, Vajapeyam S, Feldman HA, Buzney CD, Mulkern RV, Kleinman PK, et al. Bone marrow changes in adolescent girls with anorexia nervosa. Journal of Bone and Mineral Research. 2010;**25**(2):298-304. DOI: 10.1359/jbmr.090805

[23] Plata-Salamán CR. Central nervous system mechanisms contributing to the cachexia–anorexia syndrome. Nutrition. 2000;**16**(10):1009-1012. DOI: 10.1016/S0899-9007(00)00413-5

[24] Szmukler GI, Andrewes D, Kingston K, Chen L, Stargatt R, Stanley R. Neuropsychological impairment in anorexia nervosa: Before and after refeeding. Journal of Clinical and Experimental Neuropsychology. 1992;**14**(2):347-352. DOI: 10.1080/01688639208402834

[25] Chesney E, Goodwin GM, Fazel S. Risks of all-cause and suicide mortality in mental disorders: A meta-review. World Psychiatry. 2014;**13**(2):153-160. DOI: 10.1002/wps.20128

[26] Pompili M, Mancinelli I, Girardi P, Ruberto A, Tatarelli R. Suicide in anorexia nervosa: A meta-analysis. International Journal of Eating Disorders. 2004;**36**(1):99-103. DOI: 10.1002/eat.20011

[27] Keski-Rahkonen A, Mustelin L. Epidemiology of eating disorders in Europe: Prevalence, incidence, comorbidity, course, consequences, and risk factors. Current Opinion in Psychiatry. 2016;**29**(6):340-345. DOI: 10.1097/YCO.0000000000000278

[28] Ulfvebrand S, Birgegård A, Norring C, Högdahl L, von Hausswolff-Juhlin Y. Psychiatric comorbidity in women and men with eating disorders results from a large clinical database. Psychiatry Research. 2015;**230**(2):294-299. DOI: 10.1016/j.psychres.2015.09.008

[29] Carter JC, Bewell C, Blackmore E, Woodside DB. The impact of childhood sexual abuse in anorexia nervosa. Child Abuse & Neglect. 2006;**30**(3):257-269. DOI: 10.1016/j.chiabu.2005.09.004

[30] Franko DL, Keel PK. Suicidality in eating disorders: Occurrence, correlates, and clinical implications. Clinical Psychology Review. 2006;**26**(6):769-782. DOI: 10.1016/j.cpr.2006.04.001

[31] Keski-Rahkonen A, Hoek HW, Susser ES, Linna MS, Sihvola E, Raevuori A, et al. Epidemiology and course of anorexia nervosa in the community. American Journal of Psychiatry. 2007;**164**(8):1259-1265. DOI: 10.1176/appi.ajp.2007.06081388

[32] Keel PK, Brown TA. Update on course and outcome in eating disorders. International Journal of Eating Disorders. 2010;**43**(3):195-204. DOI: 10.1002/eat.20810

[33] Ogden J. The Psychology of Eating: From Healthy to Disordered Behavior. West Sussex, UK: John Wiley & Sons; 2011

[34] Pike KM, Dunne PE. The rise of eating disorders in Asia: A review. Journal of Eating Disorders. 2015;**3**(1):33. DOI: 10.1186/s40337-015-0070-2

[35] Machado PP, Gonçalves S, Hoek HW. DSM-5 reduces the proportion of EDNOS cases: Evidence from community samples. International Journal of Eating Disorders. 2013;**46**(1):60-65. DOI: 10.1002/eat.22040

[36] Harada T, Yamauchi T, Kodama Y, Miyamoto S, Kiriike N, Inoue K. Clinical features of Japanese males with anorexia nervosa. Osaka City Medical Journal. 2016;**62**(2):85-93. DOI: 00306096-62-2-85

[37] Sweeting H, Walker L, MacLean A, Patterson C, Räisänen U, Hunt K. Prevalence of eating disorders in males: A review of rates reported in academic research and UK mass media. International Journal of Men's Health. 2015;**14**:2. DOI: 10.3149/jmh.1402.86

[38] Favaro A, Caregaro L, Tenconi E, Bosello R, Santonastaso P. Time trends in age at onset of anorexia nervosa and bulimia nervosa. The Journal of Clinical Psychiatry. 2009;**70**(12):1715-1721. DOI: 10.4088/jcp.09m05176blu

[39] Beck D, Casper R, Andersen A. Truly late onset of eating disorders: A study of 11 cases averaging 60 years of age at presentation. International Journal of Eating Disorders. 1996;**20**(4):389-395. DOI: 10.1002/(SICI)1098-108X(199612)20:4<389::AID-EAT6>3.0.CO;2-J

[40] Pike KM, Dunne PE, Addai E. Expanding the boundaries: Reconfiguring the demographics of the "typical" eating disordered patient. Current Psychiatry Reports. 2013;**15**(11):411. DOI: 10.1007/s11920-013-0411-2

[41] Striegel-Moore RH, Dohm FA, Kraemer HC, Taylor CB, Daniels S, Crawford PB, et al. Eating disorders in white and black women. American Journal of Psychiatry. 2003;**160**(7):1326-1331. DOI: 10.1176/appi.ajp.160.7.1326

[42] Mitchison D, Hay P, Slewa-Younan S, Mond J. The changing demographic profile of eating disorder behaviors in the community. BMC Public Health. 2014;**14**(1):943. DOI: 10.1186/1471-2458-14-943

[43] Frederick DA, Essayli JH. Male body image: The roles of sexual orientation and body mass index across five national US Studies. Psychology of Men & Masculinity. 2016;**17**(4):336. DOI: 10.1037/men0000031

[44] Matthews-Ewald MR, Zullig KJ, Ward RM. Sexual orientation and disordered eating behaviors among self-identified male and female college students. Eating Behaviors. 2014;**15**(3):441-444. DOI: 10.1016/j.eatbeh.2014.05.002

[45] Schaumberg K, Welch E, Breithaupt L, Hübel C, Baker JH, Munn-Chernoff MA, et al. The science behind the Academy for Eating Disorders' nine truths about eating disorders. European Eating Disorders Review. 2017;**25**(6):432-450. DOI: 10.1002/erv.2553

[46] Yilmaz Z, Hardaway JA, Bulik CM. Genetics and epigenetics of eating disorders. Advances in Genomics and Genetics. 2015;**5**:131-150. DOI: 10.2147/AGG.S55776

[47] Steinhausen HC, Jakobsen H, Helenius D, Munk-Jørgensen P, Strober M. A nation-wide study of the family aggregation and risk factors in anorexia nervosa over three generations.

International Journal of Eating Disorders. 2015;**48**(1):1-8. DOI: doi.org/10.1002/eat.22293

[48] Strober M, Freeman R, Lampert C, Diamond J, Kaye W. Controlled family study of anorexia nervosa and bulimia nervosa: Evidence of shared liability and transmission of partial syndromes. American Journal of Psychiatry. 2000;**157**(3):393-401. DOI: 10.1176/appi.ajp.157.3.393

[49] Hinney A, Volckmar AL. Genetics of eating disorders. Current Psychiatry Reports. 2013;**15**(12):423. DOI: 10.1007/s11920-013-0423-y

[50] Cederlöf M, Thornton LM, Baker J, Lichtenstein P, Larsson H, Rück C, et al. Etiological overlap between obsessive-compulsive disorder and anorexia nervosa: A longitudinal cohort, multigenerational family and twin study. World Psychiatry. 2015;**14**(3):333-338. DOI: 10.1002/wps.20251

[51] Bulik CM, Kleiman SC, Yilmaz Z. Genetic epidemiology of eating disorders. Current Opinion in Psychiatry. 2016;**29**(6):383. DOI: 10.1097/YCO.0000000000000275

[52] Nakabayashi K, Komaki G, Tajima A, Ando T, Ishikawa M, Nomoto J, et al. Identification of novel candidate loci for anorexia nervosa at 1q41 and 11q22 in Japanese by a genome-wide association analysis with microsatellite markers. Journal of Human Genetics. 2009;**54**(9):531. DOI: jhg200974

[53] Duncan L, Yilmaz Z, Walters R, Goldstein J, Anttila V, Bulik-Sullivan B, et al. Genome-wide association study reveals first locus for anorexia nervosa and metabolic correlations. The American Journal of Psychiatry. 2017;**174**(9):850-858. DOI: 10.1176/appi.ajp.2017.16121402

[54] Li D, Chang X, Connolly JJ, Tian L, Liu Y, Bhoj EJ, et al. A genome-wide association study of anorexia nervosa suggests a risk locus implicated in dysregulated leptin signaling. Scientific Reports. 2017;**7**(1):3847. DOI: s41598-017-01674-8

[55] Steiger H, Booij L, Kahan E, McGregor K, Thaler L, Fletcher E, et al. A longitudinal, epigenome-wide study of DNA methylation in anorexia nervosa: Results in actively ill, partially weight-restored, long-term remitted and non-eating-disordered women. Journal of Psychiatry & Neuroscience: JPN. 2019;**44**(3):205-213. DOI: 10.1503/jpn.170242

[56] Seitz J, Herpertz-Dahlmann B, Konrad K. Brain morphological changes in adolescent and adult patients with anorexia nervosa. Journal of Neural Transmission. 2016;**123**(8):949-959. DOI: 10.1007/s00702-016-1567-9

[57] Frank GK. Recent advances in neuroimaging to model eating disorder neurobiology. Current Psychiatry Reports. 2015;**17**(4):22. DOI: 10.1007/s11920-015-0559-z

[58] von Hausswolff-Juhlin Y, Brooks SJ, Larsson M. The neurobiology of eating disorders—A clinical perspective. Acta Psychiatrica Scandinavica. 2015;**131**(4):244-255. DOI: 10.1111/acps.12335

[59] Steinglass JE, Walsh BT. Neurobiological model of the persistence of anorexia nervosa. Journal of Eating Disorders. 2016;**4**(1):19. DOI: 10.1186/s40337-016-0106-2

[60] Santel S, Baving L, Krauel K, Münte TF, Rotte M. Hunger and satiety in anorexia nervosa: fMRI during cognitive processing of food pictures. Brain Research. 2006;**1114**(1):138-148. DOI: 10.1016/j.brainres.2006.07.045

[61] Miyake Y, Okamoto Y, Onoda K, Shirao N, Okamoto Y, Otagaki Y, et al. Neural processing of negative word

stimuli concerning body image in patients with eating disorders: An fMRI study. NeuroImage. 2010;**50**(3):1333-1339. DOI: 10.1016/j.neuroimage.2009.12.095

[62] Urgesi C, Fornasari L, Perini L, Canalaz F, Cremaschi S, Faleschini L, et al. Visual body perception in anorexia nervosa. International Journal of Eating Disorders. 2012;**45**(4):501-511. DOI: 10.1002/eat.20982

[63] Nunn K, Frampton I, Gordon I, Lask B. The fault is not in her parents but in her insula—A neurobiological hypothesis of anorexia nervosa. European Eating Disorders Review: The Professional Journal of the Eating Disorders Association. 2008;**16**(5):355-360. DOI: 10.1002/erv.890

[64] Nunn K, Frampton I, Fuglset TS, Törzsök-Sonnevend M, Lask B. Anorexia nervosa and the insula. Medical Hypotheses. 2011;**76**(3):353-357. DOI: 10.1016/j.mehy.2010.10.038

[65] Bruch H. The psychiatric differential diagnosis of anorexia nervosa. Anorexia Nervosa. The Journal of Nervous and Mental Disease. 1965;**141**:555-566

[66] Zerbe KJ. The crucial role of psychodynamic understanding in the treatment of eating disorders. Psychiatric Clinics of North America. 2001;**24**(2):305-313. DOI: 10.1016/S0193-953X(05)70226-4

[67] Bruch H. Four decades of eating disorders. Handbook of Psychotherapy for Anorexia Nervosa and Bulimia. New York: Guilford; 1985

[68] Slade P. Towards a functional analysis of anorexia nervosa and bulimia nervosa. British Journal of Clinical Psychology. 1982;**21**(3): 167-179. DOI: 10.1111/j.2044-8260.1982.tb00549.x

[69] Beck AT. Cognitive Therapy and the Emotional Disorders. New York: International Universities Press; 1976

[70] Garner DM, Bermis KM. A cognitive-behavioral approach to anorexia nervosa. Cognitive Therapy and Research. 1982;**6**:123-150. DOI: 10.1007/BF01183887

[71] Fairburn C. A cognitive behavioural approach to the treatment of bulimia. Psychological Medicine. 1981;**11**(4):707-711. DOI: 10.1017/S0033291700041209

[72] Garner DM, Garfinkel PE. Socio-cultural factors in the development of anorexia nervosa. Psychological Medicine. 1980;**10**(4):647-656. DOI: 10.1017/S0033291700054945

[73] Stice E. Review of the evidence for a sociocultural model of bulimia nervosa and an exploration of the mechanisms of action. Clinical Psychology Review. 1994;**14**(7):633-661. DOI: 10.1016/0272-7358(94)90002-7

[74] Brown Z, Tiggemann M. Attractive celebrity and peer images on Instagram: Effect on women's mood and body image. Body Image. 2016;**19**:37-43. DOI: 10.1016/j.bodyim.2016.08.007

[75] Stice E, Gau JM, Rohde P, Shaw H. Risk factors that predict future onset of each DSM–5 eating disorder: Predictive specificity in high-risk adolescent females. Journal of Abnormal Psychology. 2017;**126**(1):38. DOI: 2016-47863-001

[76] Cassin SE, von Ranson KM. Personality and eating disorders: A decade in review. Clinical Psychology Review. 2005;**25**(7):895-916. DOI: 10.1016/j.cpr.2005.04.012

[77] Limburg K, Watson HJ, Hagger MS, Egan SJ. The relationship between perfectionism and psychopathology: A meta-analysis. Journal of Clinical Psychology. 2017;**73**(10):1301-1326. DOI: 10.1002/jclp.22435

[78] Tasca GA. Attachment and eating disorders: A research update. Current Opinion in Psychology. 2019;**25**:59-64. DOI: 10.1016/j.copsyc.2018.03.003

[79] Neumark-Sztainer D, Bauer KW, Friend S, Hannan PJ, Story M, Berge JM. Family weight talk and dieting: How much do they matter for body dissatisfaction and disordered eating behaviors in adolescent girls? Journal of Adolescent Health. 2010;**47**(3):270-276

[80] Mitchell KS, Mazzeo SE, Schlesinger MR, Brewerton TD, Smith BN. Comorbidity of partial and subthreshold PTSD among men and women with eating disorders in the national comorbidity survey-replication study. International Journal of Eating Disorders. 2012;**45**(3):307-315. DOI: 10.1002/eat.20965

[81] Steiger H, Gauvin L, Israël M, Koerner N, Kin NNY, Paris J, et al. Association of serotonin and cortisol indices with childhood abuse in bulimia nervosa. Archives of General Psychiatry. 2001;**58**(9):837-843. DOI: 10.1001/archpsyc.58.9.837

[82] 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. International Journal of Eating Disorders. 1997;**22**(4):339-360. DOI: 10.1002/(SICI)1098-108X(199712)22:4<339::AID-EAT1>3.0.CO;2-N

[83] NICE—National Institute for Health and Care Excellence. Eating Disorders: Recognition and Treatment. London, UK: National Institute for Health and Care Excellence; 2017

[84] Treasure TG, Szmukler G. The inpatient treatment of anorexia nervosa. In: Handbook of Eating Disorders: Theory, Treatment and Research. Chichester, England: Wiley; 1995

[85] Flament MF, Bissada H, Spettigue W. Evidence-based pharmacotherapy of eating disorders. International Journal of Neuropsychopharmacology. 2012;**15**(2):189-207. DOI: 10.1017/S1461145711000381

[86] McElroy SL, Guerdjikova AI, Mori N, Keck PE Jr. Psychopharmacologic treatment of eating disorders: Emerging findings. Current Psychiatry Reports. 2015;**17**:35. DOI: 10.1007/s11920-015-0573-1

[87] Miniati M, Marazziti D. Psychopharmacological options for adult patients with anorexia nervosa: The patients' and carers' perspectives integrated by the spectrum model. CNS Spectrums. 2019;**24**(2):225-226. DOI: 10.1017/S1092852917000700

[88] Kaye W. Neurobiology of anorexia and bulimia nervosa. Physiology & Behavior. 2008;**94**(1):121-135. DOI: 10.1016/j.physbeh.2007.11.037

[89] Fazeli PK, Calder GL, Miller KK, Misra M, Lawson EA, Meenaghan E, et al. Psychotropic medication use in anorexia nervosa between 1997 and 2009. International Journal of Eating Disorders. 2012;**45**(8):970-976. DOI: 10.1002/eat.22037

[90] Lock J, Gowers S. Effective interventions for adolescents with anorexia nervosa. Journal of Mental Health. 2005;**14**:599-610. DOI: 10.1080/09638230500400324

[91] Hay PJ, Touyz S, Sud R. Treatment for severe and enduring anorexia nervosa: A review. Australian & New Zealand Journal of Psychiatry. 2012;**46**(12):1136-1144. DOI: 10.1177/0004867412450469

[92] Le Grange D, Lock J, Agras WS, Bryson SW, Jo B. Randomized clinical

trial of family-based treatment and cognitive-behavioral therapy for adolescent bulimia nervosa. Journal of the American Academy of Child & Adolescent Psychiatry. 2015;**54**(11):886-894. DOI: 10.1016/j.jaac.2015.08.008

[93] Lock J. An update on evidence-based psychosocial treatments for eating disorders in children and adolescents. Journal of Clinical Child & Adolescent Psychology. 2015;**44**(5):707-721. DOI: 10.1080/15374416.2014.971458

[94] Schmidt U, Magill N, Renwick B, Keyes A, Kenyon M, Dejong H, et al. The Maudsley Outpatient Study of Treatments for Anorexia Nervosa and Related Conditions (MOSAIC): Comparison of the Maudsley Model of Anorexia Nervosa Treatment for Adults (MANTRA) with specialist supportive clinical management (SSCM) in outpatients with broadly defined anorexia nervosa: A randomized controlled trial. Journal of Consulting and Clinical Psychology. 2015;**83**(4):796. DOI: 10.1037/ccp0000019

[95] Fairburn CG, Cooper Z, Doll HA, O'Connor ME, Palmer RL, Dalle Grave R. Enhanced cognitive behaviour therapy for adults with anorexia nervosa: A UK–Italy study. Behaviour Research and Therapy. 2013;**51**(1):R2-R8. DOI: 10.1016/j.brat.2012.09.010

[96] Dalle Grave R, Calugi S, Doll HA, Fairburn CG. Enhanced cognitive behaviour therapy for adolescents with anorexia nervosa: An alternative to family therapy? Behaviour Research and Therapy. 2013;**51**(1):R9-R12. DOI: 10.1016/j.brat.2012.09.008

[97] Zipfel S, Wild B, Groß G, Friederich HC, Teufel M, Schellberg D, et al. Focal psychodynamic therapy, cognitive behaviour therapy, and optimised treatment as usual in outpatients with anorexia nervosa (ANTOP study): Randomised controlled trial. The Lancet. 2014;**383**(9912):127-137. DOI: 10.1016/S0140-6736(13)61746-8

[98] Linardon J, Fairburn CG, Fitzsimmons-Craft EE, Wilfley DE, Brennan L. The empirical status of the third-wave behaviour therapies for the treatment of eating disorders: A systematic review. Clinical Psychology Review. 2017;**58**:125-140. DOI: 10.1016/j.cpr.2017.10.005

[99] Chen EY, Segal K, Weissman J, Zeffiro TA, Gallop R, Linehan MM, et al. Adapting dialectical behavior therapy for outpatient adult anorexia nervosa—A pilot study. International Journal of Eating Disorders. 2015;**48**(1):123-132. DOI: 10.1002/eat.22360

[100] Zaccagnino M, Civilotti C, Cussino M, Callerame C, Fernandez I. EMDR in anorexia nervosa: From a theoretical framework to the treatment guidelines. In: Eating Disorders—A Paradigm of the Biopsychosocial Model of Illness. UK: IntechOpen; 2017. pp. 193-213. DOI: 10.5772/65695

[101] Geller J, Dunn EC. Integrating motivational interviewing and cognitive behavioral therapy in the treatment of eating disorders: Tailoring interventions to patient readiness for change. Cognitive and Behavioral Practice. 2011;**18**(1):5-15. DOI: 10.1016/j.cbpra.2009.05.005

[102] Rohde P, Stice E, Marti CN. Development and predictive effects of eating disorder risk factors during adolescence: Implications for prevention efforts. International Journal of Eating Disorders. 2015;**48**(2):187-198. DOI: 10.1002/eat.22270