

Research Progress on the Risk Factor and Intervention of Eating Disorders in Adolescents

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Abstract. Eating disorders (EDs) are a growing public health issue, particularly among adolescents, due to their increasing prevalence and serious physical and psychological consequences. This review synthesizes empirical findings on risk factors contributing to adolescent EDs and evaluates the effectiveness of major psychological interventions. Evidence indicates that biological factors (e.g., ESR1 gene variations, estrogen fluctuations), psychological traits (e.g., depression, anxiety, perfectionism), and social influences (e.g., childhood trauma, thin-ideal media exposure, family dynamics) interact to increase ED risk. Among interventions, cognitive behavioral therapy (CBT) effectively improved BMI and cognitive distortions over 20–40 weeks. Dialectical behavior therapy (DBT) reduced binge–purge behaviors and enhanced emotion regulation. Family-based therapy (FBT) helped restructure maladaptive family patterns, while self-compassion interventions improved body satisfaction and treatment accessibility. Adolescent EDs emerge from complex biopsychosocial interactions. Psychological treatments—particularly CBT, DBT, and FBT—demonstrate strong therapeutic outcomes. Self-compassion-based approaches provide promising adjunctive benefits and warrant further exploration, especially in scalable digital formats.

Keywords: Eating disorders; Adolescents; Risk Factor; Intervention.

1. Introduction

Eating Disorders (EDs) are common psychiatric illnesses in modern society, characterized by persistent patterns of abnormal eating behaviors. Eating disorders represent a category of mental health conditions marked by chronic irregularities in dietary patterns or associated activities. These disturbances lead to substantial deterioration in either physiological well-being or socio-psychological adaptation, stemming from abnormal nutrient intake or assimilation processes [1]. These disorders represent a range of abnormal eating or feeding behaviors that cannot be explained by other health conditions, are not appropriate for the developmental stage, nor are they culturally sanctioned behaviors. Feeding disorders include abnormal behaviors unrelated to body weight or shape concerns, such as eating non-food substances or habitual regurgitation. Eating disorders, in contrast, are marked by abnormal eating behaviors and preoccupation with food, as well as significant concerns about body weight and shape [2]. As society changes, the number of reports on EDs has steadily increased both domestically and internationally over the past decade, with prevalence rising year by year. EDs are now the third most common chronic illness among adolescents, after obesity and asthma [3]. They have become a serious public health issue.

According to epidemiological data from 2019, the estimated prevalence of EDs among adolescents worldwide is between 2.0% and 3.8%; in the United States, this figure is higher, at 3.8% to 5.1%; in China, prevalence among adolescents ranges from 2.5% to 6% [4]. Surveys of eating behaviors among Chinese middle and high school students suggest that adolescent ED prevalence in China is approaching that of Western countries, posing a serious threat to youth mental health.

EDs are also associated with numerous psychological and behavioral problems, including internalizing symptoms (such as anxiety and depression) and externalizing behaviors [5]. The prevalence of comorbid conditions is notably elevated among individuals with eating disorders (EDs). These patients frequently exhibit concurrent medical complications, including but not limited to nutritional deficiencies, decreased bone density, loss of muscle mass, and tooth deterioration. Furthermore, psychiatric comorbidities are commonly observed, particularly affective disorders,

generalized anxiety, OCD, addictive behaviors, and various personality pathology manifestations [6]. Notably, anorexia nervosa is particularly lethal, with mortality due to suicide, multi-organ failure, or cardiac arrhythmia, making it the psychiatric disorder with the highest mortality rate—between 5% and 20% [7]. Investigating the causes of EDs is a crucial step in developing effective interventions for adolescents.

This review aims to synthesize risk factors and psychological interventions for adolescent EDs. It will advance etiological models of EDs, inform clinical adaptation of therapies, and prioritize scalable solutions for the mental health system.

2. Risk Factors for Adolescent Eating Disorders

2.1. Biological Factors

2.1.1. Estrogen and Genetic Factors

Research suggests that changes in estrogen levels during puberty may partly explain gender differences in adolescent ED prevalence. For example, a study in France and Germany found that certain variations in the estrogen receptor 1 (ESR1) gene significantly increase ED risk in females. Notably, the emergence of anorexia nervosa (AN) during pubertal development coincides with elevated estrogen levels, as indicated by prior research. Twin studies comparing monozygotic and dizygotic pairs have revealed a significantly higher incidence of AN in adult females relative to males, implying that prenatal sex hormone exposure may contribute to disease susceptibility. Additionally, experimental evidence in murine models demonstrates that estrogen receptor (ER) agonists modulate social-based food preference acquisition in female subjects, further supporting the role of hormonal signaling in eating-related behaviors [8].

2.1.2. Body Weight and Shape

Some studies in China have found that overweight and obese adolescents are more likely to develop EDs compared to those of normal weight. Specifically, these adolescents often exhibit heightened concerns about weight and body shape, leading them to attempt dieting to improve appearance, a well-established risk factor for ED development [9].

2.1.3. Psychopathology

Other studies have highlighted a link between EDs and anxiety through the microbiota–gut–brain axis, suggesting that ED psychopathology is associated with specific gut microbiota compositions and diversity. Numerous studies have demonstrated that the microbial community residing in the gastrointestinal tract significantly influences body weight regulation and dietary energy harvest in both human subjects and experimental animals. A growing body of research utilizing animal models demonstrates that behavioral alterations correlate with modifications in gut microbial populations. Experimental approaches, including probiotic administration, antibiotic treatment, and fecal microbiota transplantation into germ-free rodents, have consistently revealed this connection. These intervention studies provide compelling evidence that the gut microbiome's structural characteristics and species variety influence host behavior [10].

2.2. Psychological Factors

2.2.1. Negative Emotions and Emotional Disorders

Numerous studies have demonstrated a direct relationship between mood disorders and EDs. Disordered eating behaviors are often linked to maladaptive emotion regulation strategies [11]. Research has demonstrated that anxiety significantly contributes to the growth and severity of eating disorders (EDs) across genders. For instance, an investigation conducted in Italy examined gender variations in the association between anxiety and ED symptomatology, revealing that anxiety is a key factor in ED pathology for both sexes [12]. Similarly, a study from the United States reported a

positive relationship between heightened anxiety sensitivity and the progression of ED-related symptoms, further supporting the role of anxiety in exacerbating disordered eating behaviors [13].

Patients with BED frequently exhibit depressive symptoms and may use binge eating to temporarily relieve negative emotions. A Chinese study identified depression as an independent risk factor for EDs in children and adolescents. Longitudinal research has demonstrated that baseline depression increases the risk of developing eating behavior problems six months later, even after controlling for gender, age, ethnicity, only-child status, and history of physical illness [14]. Past research has found that EDs and depression often co-occur, especially during adolescence [15].

2.2.2. Self-Objectification

Self-Objectification Theory posits that because women are often viewed through a sexualized lens by men, they internalize this perspective and come to view themselves as objects valued primarily for their appearance—a process called self-objectification [16]. Research indicates that women with higher levels of self-objectification are more prone to EDs. Additionally, multiple studies have demonstrated a strong link between perfectionism and EDs, particularly among women. Female adolescents show significantly higher levels of body-related perfectionism than males [17].

2.3. Social Factors

2.3.1. Family Environment

Studies show that parental eating behaviors significantly influence children's eating behaviors, with notable gender differences. For example, studies indicate that while maternal dietary restraint shows no statistically meaningful association with sons' eating restrictions, it serves as a robust predictor for daughters' restrained eating behaviors [18]. Mothers often exercise more control and authority over daughters' eating behaviors within mother–daughter dynamics.

2.3.2. Childhood Trauma

A Chinese study found that disordered eating behaviors are associated with childhood abuse, with emotional and physical neglect identified as independent risk factors for adolescent eating problems [14]. Emerging evidence suggests that adverse childhood experiences, particularly abuse, can contribute to the development of dysfunctional psychological characteristics such as excessive self-criticism, impulsive reactivity, a tendency to attribute outcomes to external forces, and heightened social anxiety—all of which are recognized predictors of eating pathology. A Chinese cohort study further supports this association, demonstrating that individuals exposed to early-life maltreatment exhibit significantly higher susceptibility to disordered eating behaviors later in life [19].

2.3.3. Sociocultural and Media Influences

Sociocultural values and media discourse profoundly shape body image. In today's society, the media relentlessly promote a “thin ideal.” A meta-analysis by Mingoia et al. found that the more time women spend on social media, the stronger their desire for a thin body and the lower their body satisfaction [20].

3. Psychological Treatments for Adolescent Eating Disorders

Currently, there are over ten evidence-based treatments for EDs, with pharmacotherapy and psychotherapy as the main approaches. This review focuses on psychological treatments, including but not limited to Dialectical Behavior Therapy (DBT), Cognitive Behavioral Therapy (CBT), and Family Therapy (FBT). Other modalities, such as Psychodynamic Therapy (PDT) and Interpersonal Therapy (IPT), have less robust evidence in adolescents and will not be discussed in detail here.

3.1. Cognitive Behavioral Therapy (CBT)

CBT is among the most widely used psychotherapeutic approaches, targeting individuals' distorted thinking patterns and irrational beliefs [21]. In treating EDs, CBT focuses on two main components:

cognitive factors (e.g., distorted body image, low self-worth, excessive perfectionism) and behavioral factors (e.g., dieting, binge eating, purging). CBT aims to reduce unhealthy eating behaviors by correcting irrational cognitions. Evidence indicates that 20–40 weeks of CBT can significantly improve BMI recovery and psychological symptoms in adolescents with AN, with effects sustained long-term [22]. A recent systematic review found that CBT's effectiveness is partly supported, showing outcomes comparable to other active treatments (e.g., family therapy, DBT). Over one-third of patients reached target weight (95% of expected BMI) by treatment end, and more than half of adolescents completing enhanced CBT (CBT-E) or combined CBT and FBT achieved full remission [23].

3.2. Dialectical Behavior Therapy (DBT)

Originally developed for borderline personality disorder, DBT is now widely used in treating EDs. DBT requires therapists to be highly flexible in helping clients accept themselves in the present. It consists of four main modules:

3.2.1. Mindfulness Training

Mindfulness helps individuals recognize and accept their current emotions and experiences [24]. Because ED behaviors are often automatic, patients may be unaware of their triggers. Mindfulness practice helps patients identify the origins of their disordered eating, enabling greater control over these behaviors and reducing emotional eating.

3.2.2. Interpersonal Effectiveness

ED patients often exhibit low self-esteem, perfectionism, and people-pleasing tendencies that hinder healthy relationships. Therapists help clients build self-esteem, develop self-worth, and learn to communicate assertively.

3.2.3. Emotion Regulation

As previously discussed, abnormal eating behaviors can be strategies for coping with negative emotions. Teaching patients to manage negative emotions and strengthen coping skills is crucial for reducing maladaptive eating behaviors.

3.2.4. Distress Tolerance

ED patients often lack the capacity to endure distress. DBT teaches them to approach pain with acceptance, reducing harmful behaviors like restrictive eating or purging.

DBT emphasizes finding a balance between 'change' and 'acceptance.' A case study involving six adolescent female AN patient who underwent 25 weeks of DBT treatment indicated a decrease in uncontrolled overeating and compensatory vomiting compared to pre-treatment levels, along with improvements in psychopathological symptoms. The average BMI of the six patients increased from 15.6 kg/m² before treatment to 18.1 kg/m² after treatment, with five no longer meeting the diagnostic criteria for AN [25].

3.3. Family-based therapy (FBT)

Family Therapy approaches EDs through the lens of family systems theory, viewing individual problems as rooted in broader family dynamics. For anorexia nervosa, Structural Family Therapy sees the disorder as arising from enmeshed family relationships, parental overprotection, conflict avoidance, and rigidity. Treatment aims to restructure these patterns, improving family functioning to support recovery. Structural FBT emphasizes forming a parental alliance to combat the illness and strictly managing the patient's diet in the early stages. Strategic FBT, by contrast, does not assume a specific etiology for AN but focuses on symptom change and acknowledges the disorder's impact on all family members. It emphasizes practical strategies to change dysfunctional behaviors.

3.4. Self-Compassion Focused Interventions

Self-compassion represents a constructive affective orientation toward oneself, allowing people to develop clearer self-awareness and maintain unconditional self-acceptance. This psychological stance helps prevent the detrimental effects associated with critical self-evaluation. Research has demonstrated that interventions aimed at enhancing self-compassion can lead to increased body satisfaction and body appreciation [26]. Self-compassion interventions often combine mindfulness training. Two common approaches are Mindful Self-Compassion Training (MSC) and Compassion-Focused Therapy (CFT). CFT is more systematic and mature, while MSC is more flexible.

3.4.1. Compassion-Focused Therapy (CFT)

Originally developed for patients with chronic mental health issues who remain highly self-critical despite prior treatment, CFT uses techniques such as meditation, letter writing, and role-play. A systematic review of 15 CFT studies over the past decade found that CFT significantly improved self-compassion and self-reassurance while reducing depression, self-criticism, and ED symptoms [27].

3.4.2. Mindful Self-Compassion Training (MSC)

MSC is designed mainly for non-clinical populations, using yoga, meditation, and mindful eating to integrate self-compassion practices into daily life. Follow-up studies have shown sustained improvements in self-compassion, mindfulness, and well-being up to 6–12 months after intervention [28].

3.4.3. Online Self-Compassion Interventions

Traditional self-compassion interventions can lack flexibility and scalability. Recent research has combined traditional methods with internet delivery to create diverse online interventions with promising results. One study comparing an 8-week mobile app intervention with face-to-face delivery found that the app was equally effective in enhancing mindfulness and self-compassion [29]. A systematic review of 27 mobile-based interventions found that online, low-intensity, simple formats produced greater improvements in self-compassion with less participant burden [30].

4. Conclusion and Future Directions

Eating disorders are complicated mental health illnesses caused by the interaction of biological, psychological, and sociocultural factors. Biologically, hormonal fluctuations, genetic predispositions, and gut–brain axis dysfunction contribute to increased vulnerability. Psychologically, traits such as emotional dysregulation, perfectionism, and self-objectification are commonly implicated. On a social level, excessive parental control, childhood trauma, and the internalization of thin-ideal cultural norms further exacerbate risk. Evidence-based interventions, including dialectical behavior therapy (DBT), cognitive-behavioral therapy (CBT), and family-based therapy (FBT), have demonstrated efficacy in symptom reduction and weight restoration. Recently, self-compassion-based interventions have displayed promise in improving body image and enhancing accessibility through digital platforms.

Given the high prevalence and mortality rate of eating disorders, particularly among adolescents, early detection and intervention are essential. Integrative treatment approaches and scalable digital solutions are especially critical in regions with limited clinical resources. However, several challenges remain. The underlying mechanisms linking genetic, psychological, and social factors are not yet fully understood. Moreover, long-term treatment outcomes—particularly for DBT and self-compassion interventions—require further empirical validation. Standardized approaches for managing common comorbidities, such as depression and anxiety, also remain underdeveloped.

Future research should prioritize culturally sensitive investigations of risk factors, comparative effectiveness studies across intervention types, and the development of integrated treatment models. Preventive efforts should focus on school-based programs targeting body image and emotion

regulation. Technological innovation in treatment delivery, paired with rigorous quality control, will be key to advancing the accessibility and effectiveness of eating disorder care.

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