

Review Article

# Eating Disorders in Children: A Narrative Review

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## Abstract

This narrative review covers research from the years 2019-2024 on eating disorders in children. This research suggests that global prevalence rates have been highly variable, ranging from a low of .95% to 22% and the rates are increasing. The variability of rates may relate to different types of eating disorders or to age range differences of the samples, as the rates are higher for older children and those with less severe problems. Several different types are represented here including anorexia nervosa, bulimia nervosa, binge eating and avoidant/restrictive food intake disorder. Other feeding problems reviewed here are neophobia, picky eating, failure to thrive and obesity. A few comorbidities exacerbate feeding disorders including anxiety, depression, conduct disorder, obsessive-compulsive disorder and attention deficit/hyperactivity disorder. Predictors/risk factors have been the primary focus in this literature and have included perfectionism, appearance comparison and body image dissatisfaction. Both psychological and physical interventions have included family-based treatment and unguided internet cognitive behavioral therapy as well as manual therapies and herbal medicine. Surprisingly, only a couple papers were found on potential underlying mechanisms including a review of studies showing EEG waves suggestive of attention to visual food stimuli. Similarly, another group reported altered reward responses to food related stimuli on fMRIs as well as decreased gray matter volume and cortical thickness in areas of the brain associated with reward. The studies in this review highlight the prevalence and severity of eating disorders in children. However, they have been primarily based on parent-report surveys that have yielded mixed results across different types of eating disorders.

**Keywords:** Eating Disorders; Children; Body Image Dissatisfaction; Anxiety; Depression

## Eating Disorders in Children: A Narrative Review

Eating disorders are among the most common problems in children, ranging in severity from picky eating to DSMV classified eating disorders. This narrative review is focused on eating problems and eating disorders and summarizes 39 papers that were derived from a search on PubMed and PsycINFO using the terms eating disorders in children and the years 2019-2024. Exclusion criteria included case studies and non-English language papers. The publications can be categorized as different types of eating disorders, prevalence data, predictors/risk factors for eating disorders, comorbidities, interventions and potential underlying biological mechanisms. This review is accordingly divided into sections that correspond to those categories. Although some papers could be grouped in more than one category, 10 papers are focused on different types of eating disorders, 8 on prevalence data, 13 on predictors/risk factors, 5 on comorbidities 5 on interventions and 2 on potential underlying biological mechanisms.

## Types of Eating Disorders

This literature has included several feeding problems as well as DSMV classified eating disorders (Table 1). The feeding problems seem to occur at earlier ages and are seemingly less severe than the eating disorders.

## Feeding Problems

Several feeding problems appear in this literature including neophobia (fear of new things), picky eating, food insecurity, dietary diversity, emotional eating, failure to thrive and obesity. These numerous eating problem labels seemingly have derived from the primary symptoms appearing in the different studies (Table 1).

In a paper entitled "Food neophobia in children", neophobia is defined as the reluctance to eat new foods, avoiding tasting unknown products and unwilling to accept new flavors or textures [1]. The authors suggested that neophobia is to be differentiated from picky eating, but they did not specify the differences.

In a study called "Picky eating in children: causes and consequences", early feeding difficulties, late introduction of lumpy foods and parental pressure were considered risk factors for picky eating [2]. Protective factors included provision of fresh foods, parents eating the same meal and positive social interaction at meals. Potential negative effects of picky eating are low intake of iron and zinc (that are contained in fruits and veggies), thinness, constipation and the development of an eating disorder. Like many of the studies in this literature, the relative importance of risk factors for feeding problems or even the relative significance of protective factors has not been determined by logistic or linear regressions.

In another paper by the same authors, the same database (the Avon Longitudinal Study of Parents and Children) was used to assess the growth and body composition of children who were picky eaters (age 7 to 17-years) [3]. Body composition was assessed five times by X-ray absorptiometry and height and weight were recorded seven times over the ten-year period. The children were classified as thin/normal/overweight or obese. BMI (Body Mass Index) and LMI (Lean Mass Index) were lower in boys who were picky eaters, but not girls. However, young boys are often shorter than the same-age girls and height is a factor that is entered into calculations of body mass index and lean mass index.

Other factors noted to influence early feeding problems include low dietary diversity and food insecurity. In a paper entitled "Evaluation and management of reduced dietary diversity in children with pediatric feeding disorder", the authors suggested that it was common in children with developmental disorders [4]. Dietary diversity was based on the Dietary Diversity Index which measures micronutrient status and long-term metabolic health. Factors like texture, taste, temperature, smell and color should also be included in a measure of dietary diversity.

Food insecurity has been associated with attempts to lose weight in children [5]. These findings were based on the National Health and Nutrition Survey of 8-to-15-year-old youth. Surprisingly, food insecurity was only noted in children of healthy weight, not in those children who were overweight or underweight. Further, it is not clear whether the healthy weight children were attempting to lose weight for food insecurity reasons or for "appearance comparison" reasons related to social media.

Emotional eating has been associated with excessive carbohydrate and fat intake during a meal in at least one study [6]. In this sample (N=200 8-to-17-year-old youth), emotional eating and eating in the absence of hunger were associated with loss of control of eating and alexithymia (a personality trait that makes it difficult to identify, express or describe one's emotions). Emotional eating has also been described as loss of emotional control in a sample of 572 obese children [7]. The use of the term emotional eating for excessive food intake implies that the loss of emotional control is the underlying problem that leads to obesity, although these are cross-sectional data that cannot be interpreted for causality.

In contrast to obesity, growth faltering, a new term for failure to thrive, has been defined as failure to reach expected weight, height or body mass index for age as determined by anthropometric scores. The authors suggested that growth faltering often leads to eating disorders including anorexia, bulimia and avoidant/resistant food intake disorder.

| Types             | First authors |
|-------------------|---------------|
| Feeding Problems  |               |
| Neophobia         | Kebos         |
| Picky Eating      | Taylor        |
| Dietary Diversity | VanHoorn      |

|                                           |                  |
|-------------------------------------------|------------------|
| Food Insecurity                           | Masler           |
| Emotional Eating                          | Shank, Vervoort  |
| Growth Faltering                          | Goodwin          |
| Eating Disorders                          |                  |
| Avoidant/Restrictive Food Intake Disorder | Zanna, Cernaglia |
| Disordered Eating                         | Lopez-Gil        |
| Anorexia                                  | Zanna, Piao      |
| Binge Eating                              | Murray           |
| Bulimia                                   | Piao             |

**Table 1:** Types of feeding problems and eating disorders in children (and first authors).

### Eating Disorders

Several different types of eating disorders have been classified by the DSMV. They include anorexia nervosa, bulimia nervosa, binge eating disorder, Avoidant/Restrictive Feeding Intake Disorder (ARFID), pica and rumination disorder. According to the DSMV, the three different forms of restrictive and selective eating disorders include anorexia nervosa-restrictive, anorexia nervosa-atypical and avoidant/restrictive food intake disorder [8].

The newest DSMV feeding disorder category has been labeled avoidant/restrictive food intake disorder. It has three types including lack of interest in eating food, sensory avoidance which refers to issues with food tastes, textures, temperature and smell and fear of adverse consequences which include fear of illness, choking, nausea and allergies. Avoidant/Restrictive Food Intake Disorder (ARFID) has typically been associated with low weight at a younger age of onset and has frequently been related to separation anxiety and attention deficit/hyperactivity disorder [8]. The younger age of onset and these comorbidities may be the underlying factors that led the DSMV committee to add ARFID.

In a study on unselected children (N=263 children age 5 to 17-years-old) rigidity and oral texture sensitivity led to selective eating which in turn led to ARFID [9]. The children with ARFID showed weight loss, nutritional deficiencies and /or psychosocial impairment. Of this sample, 179 also showed anxiety and obsessive spectrum disorder symptoms and 185 showed autism spectrum disorder symptoms.

An example of the early onset of ARFID is a study that involved videotaping 100 mother-child dyads during a main meal (20 minutes) when the children averaged 30-months-old [10]. The mothers also completed the Child Behavior Checklist and the Symptom Checklist. The authors labeled the children with ARFID as having 3 different subtypes including irritable/impulsive, sensory food aversions and post-traumatic feeding disorders.

The children who were described as irritable/impulsive were the most “dysfunctional” including having internalizing and attention problems as well as emotional and behavioral dysregulation. Their mothers were the most depressed and had poor feeding interactions.

The children with sensory food aversions had high emotional reactivity but less compromised emotional-behavioral functioning, their mothers had the lowest psychopathology and their feeding interactions were considered normal. The children with post-traumatic feeding disorders had externalizing problems and more emotional and behavioral self-dysregulation. Their mothers had more obsessive-compulsive behavior and anxiety and their feeding interactions were poor.

| Prevalence                                                 | First authors |
|------------------------------------------------------------|---------------|
| 0.95% lifetime                                             | Sanzan        |
| 22% global-30%female, 17% male                             | Lopez-Gil     |
| 56% anorexia-restrictive, 27% avoidant/restrictive (ARFID) | Zanna         |
| 17% anorexia-atypical                                      |               |

|                                                   |           |
|---------------------------------------------------|-----------|
| 5% binge eating                                   | Murray    |
| 24% increase in bulimia, 17% increase in anorexia | Goodwin   |
| 65% increase in eating disorders                  | Hopkinson |

**Table 2:** Prevalence of different eating disorders in children (and first authors).

### Prevalence of Eating Disorders in Children

The prevalence of eating disorders in children is highly variable (Table 2). The papers on the recent prevalence of eating disorders in children can be grouped by global prevalence, prevalence varying by type of eating disorder and increasing prevalence.

#### *Global Prevalence*

In the Adolescent Brain and Cognitive Development (ABCD) study in the U.S. (N=11,721 nine and ten-year-old children), the lifetime prevalence was 0.95% [11]. The risk factors in this sample included being black, multi-racial, being from unmarried parents and from economically insecure families.

In a larger global sample from 16 countries (N=32 studies and 63,181 children), 22% had disordered eating [12]. The female children had a greater prevalence (30% versus 17% for male children) and there was a greater prevalence with increasing age and increasing Body Mass Index (BMI). These data were based on a five-item scale called the SCOFF (Sick, control, on, fat, food). The greater prevalence in this global sample (22%) versus the U.S. sample (0.95%) likely relates to the global sample having older children and adolescents versus the inclusion of only 9 and 10-year-old children in the US sample.

#### *Varying Prevalence by Type of Eating Disorder*

The prevalence of eating disorders has varied by the type of eating disorder which would be expected given their varying severity. Highly variable prevalence rates were noted, for example, in a sample of different eating disorders based on the Eating Disorder Inventory [8]. In this study (N= 346), the anorexia-restrictive sample had a prevalence of 56% while the ARFID group had a prevalence rate of 27% and the prevalence rate was 17% for the sample of those categorized as anorexia-atypical. The prevalence of binge eating has typically been lower. For example, in the ABCD sample of 9 to 10-year-old children (N= 11,878), the prevalence of binge eating was 5% [13]. These data were based on the SCOFF questionnaire as opposed to the Eating Disorder Inventory that was used in the previous study, highlighting the potential problem of different questionnaires/inventories yielding different data.

#### *Increasing Prevalence Rate*

Significant increases have been noted in eating disorders over the past several decades. In a paper entitled "Alarming changes in the global burden of mental disorders in children and adolescents from 1990 to 2019: a systematic analysis of the Global Burden of Disease Study", an increase of 24% was reported for bulimia and an increase of 17% for anorexia [14].

An even greater increase of 65% was reported in a study entitled "Why eating disorders in children and young people are increasing: implications for practice" [15]. This sample from the NHS England Database showed an increase from 603 children in 2016 to 1721 children in 2022. The greater increase data were derived from the more recent period of 2016 to 2022, highlighting the recency of the increasing prevalence of eating disorders in children.

### Predictors/Risk Factors for Eating Disorders in Children

The predictors/risk factors that appeared in this recent literature on eating disorders in children can be grouped into three categories (Table 3). These include perfectionism, body image/appearance dissatisfaction and traumatic events.

#### *Perfectionism*

In a paper entitled "An examination of direct, indirect and common eating disorder symptoms, anxiety and depression in children with eating disorders", structural equation modeling was conducted for three different models. In this sample of females with eating disorders (N=231), the results suggested that anxiety and depression mediated the relationship between perfectionism and eating disorders. Further, eating disorders mediated the relationship between perfectionism and anxiety and/or depression. This reciprocal relationship between eating disorders and comorbidities has been noted in several studies.

In a study entitled “Perfectionism is associated with higher eating disorder symptoms and lower remission in children and adolescents diagnosed with eating disorders”, the Eating Disorder Inventory was given to 10- to 17-year-old youth (N = 175) [16]. Greater perfectionism and food intake led to less likelihood of remission at 12 months.

Perfectionism was noted to relate to anxiety and depression across time in a sample of youth with pediatric eating disorders (N=167 females 10-17 years-old) [17]. These relationships were noted at intake, 6 and 12 months. Perfectionism did not determine change in anxiety and depression over time.

In a systematic review and meta-analysis on perfectionism and eating disorders, 39 studies (N=13,954 participants) were included [18]. Perfectionistic striving and concerns were associated with eating disorder symptoms. However, there were limits to the studies in this review including heterogeneity of the methods, insufficient studies entering age as a moderator and cross-sectional data.

| Prevalence                            | First Authors                 |
|---------------------------------------|-------------------------------|
| Perfectionism                         | Dreiberg, Morgan-Lowes, Bills |
| Body Image/Appearance Dissatisfaction | DeCoen, Sattler, Giusti       |
| Potentially Traumatic Events          | Mendoza, Suren                |

**Table 3:** Predictors/risk factors for eating disorders in children (and first authors).

#### *Body Image/Appearance Dissatisfaction*

A few studies have appeared on body dissatisfaction and its relationship to eating disorders in this literature. A study entitled “Body dissatisfaction and disordered eating symptoms in children's daily life: can parents protect against appearance comparison on social media?”, 10-to-12-year-old children were assessed three times per day for two weeks (N= 50) [19]. Based on a scale called the Ecological Momentary Assessment, upward comparisons on social media were associated with body dissatisfaction, compensatory exercise and loss of eating control. The recent increase in excessive media use/internet addiction by younger children may be contributing to the increasing prevalence of eating disorders in younger children.

In a systematic review of 8 studies on body image disturbance in children with anorexia nervosa and bulimia nervosa, children with those eating disorders had high scores on components of the Eating Disorder Inventory [20]. These included perception, global subjective satisfaction and affect/cognition. In contrast, in a systematic mapping review (N=9 studies), body image dissatisfaction and eating disorder risk were noted in children with bulimia, but not children with anorexia [21]. These data were not surprising given that the social media appearance comparison would likely favor those children with anorexia versus bulimia.

Surprisingly, except for the “appearance comparison” terms in the body dissatisfaction paper, there has been little reference to the comorbidity of social media/internet addiction and eating disorders. Also surprisingly, perfectionism and body image/appearance dissatisfaction have not been explored in the same study. Perfectionism would presumably be a predictor variable for body image/appearance dissatisfaction which, in turn, would be a mediator or moderator for eating disorders. Mediation/moderation and structural equations models have rarely appeared in this recent literature.

#### *Potentially Traumatic Events*

Potentially traumatic events have also led to eating disorders. For example, in a longitudinal study, potentially traumatic events led to binge-purge eating [22]. In that U.S. nationwide Adolescent Brain and Cognitive Development (ABCD) study, the 9-to-10-year-old children who reported potentially traumatic events at baseline had 1.9 greater odds of experiencing binge-purge eating disorder one year later.

The COVID pandemic, which could be considered a traumatic event, has also led to an increase in eating disorders in children in the U.S., Canada and Norway. In the Norwegian Registry for Primary Healthcare, for example, eating disorders increased 67% during COVID, primarily in females 6- to 12-years-old [23]. The prevalence was 0.05% before the pandemic and 0.20% after the onset of the pandemic. This significant increase is another example of a seemingly stressful event for children that was

associated with eating disorders. Not only were children stressed by isolation, missing school and their peers, as well as inactivity, but they also had more time at home for eating. However, according to the COVID study data, overweight was not the only eating problem that occurred during the pandemic.

### Comorbidities of Eating Disorders in Children

Several comorbidities have been associated with eating disorders (Table 4). They include depression, anxiety, ADHD and OCD. In a paper entitled "Prevalence and correlates of psychiatric comorbidities in children and adolescents with full and sub-threshold avoidant/restrictive food, intake disorder", 74 children with ARFID were given structured clinical interviews [1]. Forty-five percent of the children had a current comorbidity and 53% had a lifetime comorbidity. Eight percent were currently experiencing suicidality and 14% lifetime suicidality. Severity on the Sensory Sensitivity Profile was associated with greater odds of developing disruptive disorder, conduct disorder, depression and bipolar disorder. Severity on the Fear of Consequences Profile was associated with greater odds of anxiety, Obsessive Compulsive Disorder (OCD) and trauma-related disorder.

In a paper entitled "Psychiatric comorbidity of eating disorders in children between the ages of nine and ten", the ABCD study data set (N=11,718) was used to explore comorbidities. Children with major depression and Post-Traumatic Stress Disorder (PTSD) experienced the most comorbidities. The comorbidities for children with eating disorders were anxiety disorder (71%), ADHD (48%), disruptive/impulsive control disorder (45%), mood disorders (30%) and OCD (29%). Given that perfectionism is a frequent predictor of eating disorders and perfectionism has been associated with OCD, it is surprising that OCD was the least prevalent comorbidity.

In another study on children with ARFID (N =50 ARFID children and 98 controls), the Standard Feeding Questionnaire (SFQ) for picky eating was given along with the Screen for Anxiety Related Emotional Disorders (SCARED), the Strength and Difficulties Questionnaire (SDQ) and the Sensory Responses Questionnaire (SRQ) [24]. The children with ARFID had more feeding difficulties that led to more internalizing behaviors.

In the ABCD study (N=11,721 children 9 and 10-years-old), depression was the most common comorbidity for eating disorders [25]. Surprisingly, only 40% were receiving treatment either for their eating disorder or for their depression.

In a systematic review of 30 studies on children with Avoidant/Restrictive Food Intake Disorder (ARFID), anxiety disorders were comorbid in 9 to 72% of the children and autism spectrum disorder was comorbid in 8 to 55 % of the children [25]. Among the 30 studies, 5 to 23% of the children were receiving educational services for prevention, 32 to 64% of the children were attending feeding clinics and 3 to 16% of the children were participants in non-clinical samples, highlighting the need for interventions for eating disorders.

| Comorbidities                                                    | First Authors  |
|------------------------------------------------------------------|----------------|
| 45% current comorbidity, 53% lifetime comorbidity                | Kambanis       |
| 8% current suicidality, 14% lifetime suicidality                 |                |
| 71% anxiety disorder, 48% ADHD, 45% disruptive impulsive control | Convertino     |
| 30% mood disorders, 29% obsessive-compulsive disorder            |                |
| Internalizing behaviors                                          | Iron-Segev     |
| Depression                                                       | Sanzan         |
| 9-72% anxiety disorder, 8-55% autism spectrum disorder           | Sanchez-Cerezo |

**Table 4:** Comorbidities of eating disorders in children (and first authors).

### Interventions for Eating Disorders in Children

Very few intervention studies have appeared in this literature on eating disorders in children. They include psychological therapies and physical therapies (Table 5).

### *Psychological Therapies*

The psychological therapies have included family-based therapy and Internet cognitive behavioral therapy. In a randomized controlled trial of unguided internet Cognitive Behavioral Therapy (CBT) for perfectionism in children with eating disorders (N= 94), CBT was more effective at three and six months as compared to waitlist control and stress management groups [26].

In a review on psychosocial treatments (N=31 studies), family-based treatment modalities were effective for anorexia and bulimia [27]. Both family-based therapy and facilitated internet cognitive behavioral therapy combined were effective for binge eating disorder.

In a more intensive treatment study for children with anorexia nervosa, a day hospital program was compared to an inpatient program (N=92 youth 8-18 years old) [28]. Surprisingly, the less intensive day hospital program was as effective as the inpatient program.

### *Physical Therapies*

The physical therapies in the recent literature on eating disorders in children have included herbal medicine and manual stimulation called Tuina in China and Chuna in Korea. Both Tuina and Chuna involve the prescription of exercises and stimulation of the Meridian system.

In a systematic review and meta-analysis of pediatric Tuina for children with anorexia, the treatment involved manipulative techniques on specific parts of the body (N= 28 randomized controlled trials totaling 2650 children) [29]. Tuina was reportedly superior to western medicine and Chinese herbs in reducing symptoms of anorexia. The authors suggested, however, that significant bias occurred across these randomized controlled trials, including problems with allocation concealment, blinding and selective reporting.

In Korea, a similar form of manual therapy called Chuna was used for the treatment of anorexia in children [30]. A meta-analysis of 25 randomized controlled trials suggested that Chuna was more effective than vitamins including vitamin B12. These manual therapies are similar to massage therapy that was effective in reducing anorexia in a much earlier study [31]. The massage therapy was also associated with decreased cortisol and increased dopamine which may have activated reward areas of the brain and contributed to a reduction in anorexia symptoms. Interestingly, the same research group had earlier reported reduced symptoms of bulimia along with decreased cortisol and increased dopamine following massage therapy [32].

Herbal medicine has also been used for the treatment of anorexia in children. In a meta-analysis on 205 randomized controlled trials, anorexia symptoms were reduced [33]. Other improvements were noted on body measurements, blood biomarkers related to gastrointestinal function and nutrition indices. Once again, however, there was a high risk of bias in the studies and heterogeneity of the various herbal medicines that were used. The authors suggested that there's a need for standardized herbal medicines and more robust randomized controlled trials.

| Interventions                                  | First Authors |
|------------------------------------------------|---------------|
| Psychological Therapies                        |               |
| Unguided Internet Cognitive Behavioral Therapy | Shu           |
| Family-Based Therapy                           | Datta         |
| Day Hospital Program                           | Costa         |
| Physical Therapies                             |               |
| Tuina (Manual Therapy in China)                | Llang         |
| Chuna (Manual Therapy in Korea)                | Lee           |
| Massage Therapy                                | Hart, Field   |
| Herbal Medicine                                | Lee           |

**Table 5:** Interventions for eating disorders in children (and first authors).

### Potential Underlying Biological Mechanisms for Eating Disorders in Children

The research on potential underlying biological mechanisms for pediatric eating disorders has been relatively rare. Studies that have explored that question have used EEG, PET (Positron Emission Tomography to assess metabolic and biochemical function), SPECT (single photon emission tomography to study glucose metabolism or neurotransmitter receptor distribution) and fMRI (functional magnetic resonance imaging to measure changes in local blood flow as a proxy for brain activation) (Table 6).

In a study entitled "EEG biomarkers in children and adolescents with feeding and eating disorders", 12 studies were reviewed including 10 on anorexia [34]. Increases occurred in posterior theta oscillations and in attentional reactivity (P300) to visual food stimuli. The increase in preparatory waves (N200 and P300) suggested decreased action control monitoring in the presence of visual food stimuli.

In a review entitled "Neurobiology of eating disorders", several different mechanisms were discussed [35]. Neurochemical studies suggested serotonin binding in anorexia and bulimia. Elevated tumor necrosis factor-alpha was also noted in anorexia and elevated cytokines (inflammatory markers) in obesity.

Gray matter volume and cortical thickness were also explored. Decreased cortical volumes were noted in anorexia, binge eating and obesity. In contrast, increased volumes were noted in bulimia. Greater structural white matter connectivity was also noted. Functional connectivity research suggested that networks associated with executive function and reward processing were altered in children with feeding disorders.

In task-based fMRI studies, altered reward responses to food-related stimuli were described. The brain areas of the ventral striatum (reward approach), the orbitofrontal cortex (reward valuation) and the anterior cingulate (reward expectation) were implicated in these studies. Connectivity between these different areas of the brain was likely occurring in response to the food-related stimuli.

| Mechanisms                                              | First Authors |
|---------------------------------------------------------|---------------|
| Posterior theta oscillations on EEG                     | Berchio       |
| Attentional reactivity (P300) to visual food stimuli    |               |
| Serotonin binding, elevated tumor necrosis factor-alpha | Frank         |
| Decreased gray matter volume and cortical thickness     |               |
| Greater structural white matter connectivity            |               |

**Table 6:** Potential underlying biological mechanisms (and first authors).

### Methodological Limitations of the Literature

Several methodological limitations can be noted for this recent literature on children with eating disorders. They include sampling problems, selection of variables and data analysis. Many of the samples included a wide age range of both children and adolescents, making it difficult to determine the eating problems/disorders that are specific to children and how those differ from eating disorders in adolescents. The wide age range also contributed to the variability in prevalence rates. Eating disorders are more prevalent in older children and adolescents, possibly because they can self-report when they are older. Also, the samples frequently varied in type of eating disorder and therefore in severity. And prevalence likely varied as a function of gender distribution as eating disorders are more prevalent in females.

Further, the samples are confounded by virtue of eating disorders being comorbid with other problems. For example, anxiety and depression which are often comorbid with eating disorders were not measured or entered as covariates in these studies on eating disorders in children. Because most of the research was cross-sectional as opposed to longitudinal, directionality or causality could not be determined and the cross-sectional data were typically collected at a single time point, making them specific to that time point. Further, the literature included very few intervention studies that were not conducted with a randomized controlled trial design, suggesting that the groups may have differed at baseline [36-38].

Regarding the variables, some studies were focused on a single predictor/risk variable while others involved multiple predictors. Multiple predictor variable studies often did not include regression analysis for determining the relative significance of the different variables. Reciprocal associations between variables were often reported, suggesting that the variables could be considered both predictors and outcomes.

The data were typically derived from parent-report measures and assessments by clinicians. Some variables that would seemingly be important for the literature on eating disorders in children, for example, excessive internet use and inactivity were rarely mentioned and were not measured. And the most frequently measured variables were negatively biased including perfectionism, appearance dissatisfaction and traumatic events.

Despite these methodological limitations, this recent literature has highlighted the severity of feeding problems and eating disorders in children and the importance of early diagnosis. Identifying the numerous risk factors will help inform not only the diagnosis but the interventions that are needed for children experiencing eating disorders.

## Conclusion

Research from the years 2019-2024 on eating disorders in children suggest that global prevalence rates have been highly variable, ranging from a low of .95% to 22% and have been increasing. The variability in prevalence is related to the samples differing on the type of eating disorder and the age of the participants. The rates are higher in samples of older children and adolescents and those with less severe eating problems. The different types of eating disorders reviewed here include anorexia, bulimia, binge eating, avoidant/restrictive food intake disorder and obesity. Lesser eating problems are also reviewed including neophobia, picky eating and failure to thrive. Comorbidities that can exacerbate the eating disorders include anxiety, depression, conduct disorder, obsessive-compulsive disorder and attention deficit/hyperactivity disorder. Predictors/risk factors include perfectionism, appearance comparison and body image dissatisfaction. Psychological interventions have included family-based treatment and unguided internet cognitive behavioral therapy. Physical therapies include manual therapies and herbal medicine. Potential underlying biological mechanisms were reviewed in studies on EEG waves suggesting attention to visual food stimuli as well as altered reward responses to food related stimuli on fMRIs. Decreased gray matter volume and cortical thickness have also been noted in areas of the brain associated with reward. Although the studies have been primarily based on parent-report surveys that have yielded mixed results across different types of eating disorders, they highlight the prevalence and severity of eating disorders in children.

## Conflict of Interest

The author has no conflict of interest to declare.

## Financial Disclosers

The authors have no financial relationships relevant to this article to disclose.

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